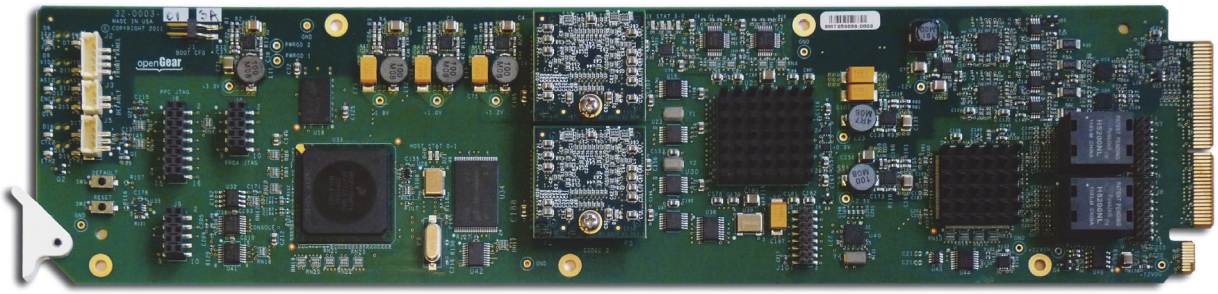
openGear

MSE-8671, MDE-8672

Single Channel H.264 Encoder,
Dual Channel H.264 Encoder
User Manual



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David Ross
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6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis. *If there's no one to authorize the required action in times of company or customer crisis - do what you know in your heart is right. (You may rent helicopters if necessary.)*

MSE-8671, MDE-8672 User Manual

- Ross Part Number: 8671DR-004-03
- Release Date: June 5, 2015.

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Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

Important Regulatory and Safety Notices to Service Personnel

Before using this product and nay associated equipment, refer to the "**Important Safety Instructions**" listed below to avoid personnel injury and to prevent product damage.

Product may require specific equipment, and/or installation procedures to be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these specific requirements.

Symbol Meanings

This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage to persons or equipment.

Warning — *The symbol with the word "**Warning**" within the equipment manual indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.*

Caution — *The symbol with the word "**Caution**" within the equipment manual indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.*

Notice — *The symbol with the word "**Notice**" within the equipment manual indicates a potentially hazardous situation, which, if not avoided, may result in major or minor equipment damage or a situation which could place the equipment in a non-compliant operating state.*

ESD Susceptibility — *This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.*

Important Safety Instructions

Caution — *This product is intended to be a component product of the DFR-8321 series and OG3-FR series frame. Refer to the DFR-8300 Series or OG3-FR Series Frame User Manuals for important safety instructions regarding the proper installation and safe operation of the frame as well as its component products.*

Warning — *Certain parts of this equipment namely the power supply area still present a safety hazard, with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cords from the chassis' rear appliance connectors before servicing this area.*

Warning — *Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after any servicing.*
This product contains safety critical parts, which if incorrectly replaced may present a risk of fire or electrical shock. Components contained with the product's power supplies and power supply area, are not intended to be customer serviced and should be returned to the factory for repair. To reduce the risk of fire, replacement fuses must be the same time and rating. Only use attachments/accessories specified by the manufacturer.

EMC Notices

United States of America
FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Notice — *Changes or modifications to this equipment not expressly approved by Ross Video Limited could void the user's authority to operate this equipment.*

CANADA

This Class "A" digital apparatus complies with Canadian ICES-003.

Cet appariel numerique de la classe "A" est conforme a la norme NMB-003 du Canada.

EUROPE

This equipment is in compliance with the essential requirements and other relevant provisions of CE Directive 93/68/EEC.

INTERNATIONAL

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002**, and found to comply with the limits for a Class A Digital device.

Notice — *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

Maintenance/User Serviceable Parts

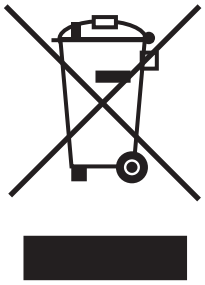
Routine maintenance to this openGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the "Contact Us" section on the last page of this manual. All openGear products are covered by a generous 5-year warranty and will be repaired without charge for materials or labor within this period. See the "Warranty and Repair Policy" section in this manual for details.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed out wheelie bin symbol invites you to use these systems.



If you need more information on the collection, re-use, and recycling systems, please contact your local or regional waste administration.

You can also contact Ross Video for more information on the environmental performance of our products.

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Introduction

In This Chapter

This chapter contains the following sections:

- Overview
- Functional Block Diagrams
- User Interfaces
- Documentation Terms and Conventions

A Word of Thanks

Congratulations on choosing an openGear MSE-8671 and/or MDE-8672 H.264 Encoder. Thank you for joining the group of worldwide satisfied Ross Video customers!

Should you have a question pertaining to the installation or operation of your encoder, please contact us at the numbers listed on the back cover of this manual. Our technical support staff is always available for consultation, training, or service.

Overview

The MSE-8671 (single channel), and the MDE-8672 (dual channel) are H.264 SD/HD encoders. Each card supports up to four stereo pairs of audio encoding. One stereo pair is dedicated to each video encoder, and the remaining two stereo pairs can be individually associated with either channel. Ethernet and ASI outputs are supported. Both SPTS and MPTS outputs are supported.

The following inputs are available:

- Software-configurable Composite or SDI video inputs, with auto-detection capability
- SDI video inputs support SD-SDI and HD-SDI with auto-detection capability
- Analog unbalanced audio stereo inputs
- SDI embedded audio support
- Two internal test packet generators (which can be used to generate ASI or IP test streams)

The following outputs are available: two ASI outputs and two Ethernet outputs. The Ethernet outputs support full-duplex 100Mb/s or 1Gb/s operation.

Each of the encoder channels can operate in one of two modes:

- **ASI/IP Streaming** — used in traditional broadcast applications. The encoded bitstream be transmitted over ASI or IP using UDP/RTP protocols, with replication capability.
- **OTT Protocols** — used for Internet streaming. These include RTMP, HSL and Direct HTTP.

Features

The encoder includes the following features:

- Video Encoding support: up to two channels of SD or HD H.264 encoding, with a maximum resolution of 1920x1080i 60 per channel
- Audio Encoding support: up to two channels of MPEG-1 Layer II or AAC-LC, and up to two additional channels of MPEG-1 Layer II
- Video inputs support composite, SD-SDI, and HD-SDI
- Audio inputs support unbalanced analog audio, and SDI embedded digital audio
- Outputs are provided on 2 ASI ports and 2 Ethernet ports, supporting 100 Mb/s or 1 Gb/s operation
- Each encoded stream can be replicated on both ASI ports or 4 times on each Ethernet port
- Support for UDP/RTP on Ethernet
- Support for Over-The-Top (OTT) protocols: HTTP Live Streaming, RTMP, Direct HTTP
- Support for SMPTE 2022 FEC on Ethernet
- Closed-Captioning support (both EIA-608 and EIA-708 captions)
- AFD extraction and insertion support
- Support for Dolby® AC-3 pass-through embedded in SDI inputs
- Multiplexing support: each output can be configured to carry either encoder as a Single Program Transport Stream (SPTS), or both encoders as a Multi Program Transport Stream (MPTS)
- Fully compliant with openGear specifications
- 5 year transferable warranty

Supported Input Video Signals

Table 1.1 lists the supported input video signals.

Table 1.1 Supported Input Signals

Composite Signals	SDI Signals
NTSC	720x480i 59.94
PAL B/G	720x576i 50
	1280x720p 50
	1280x720p 59.94
	1280x720p 60
	1920x1080p 23.98
	1920x1080p 24
	1920x1080i 50
	1920x1080i 59.94
	1920x1080i 60

Functional Block Diagrams

This section provides general workflow diagrams for the two operating modes: ASI/IP Streaming, and OTT Protocols.

ASI/IP Streaming

For ASI/IP streaming, configuring the encoder includes the following steps:

1. Configure the encoders.
2. Configure the outputs (ASI or IP).
3. Make connections between inputs and outputs.

The connections between inputs and outputs can be made as part of the input or output configuration steps. The encoder supports many-to-many connections.

Figure 1.1 describes the overall architecture of the encoder in the ASI/IP Streaming mode.

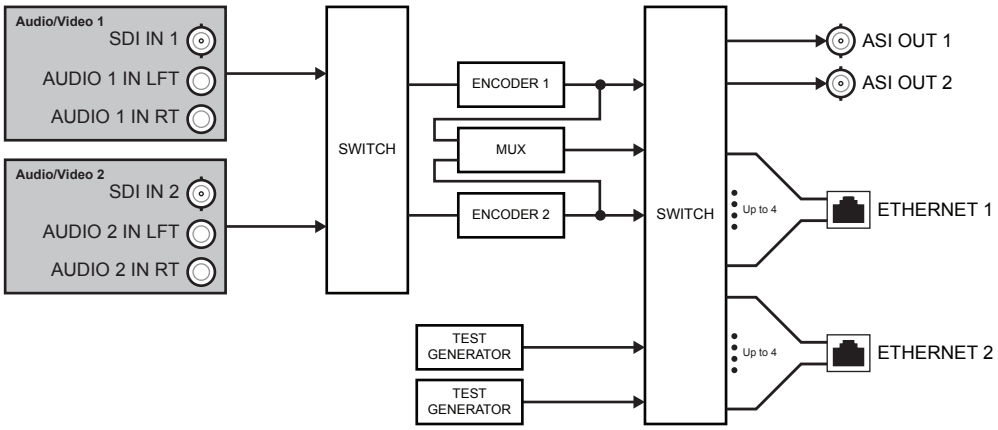


***Figure 1.1** Simplified Diagram — ASI/IP Streaming*

OTT Protocols

For OTT Protocols, all the configuration steps happen at the encoder — there is no connection phase.

Figure 1.2 describes the overall architecture in OTT Protocols mode.

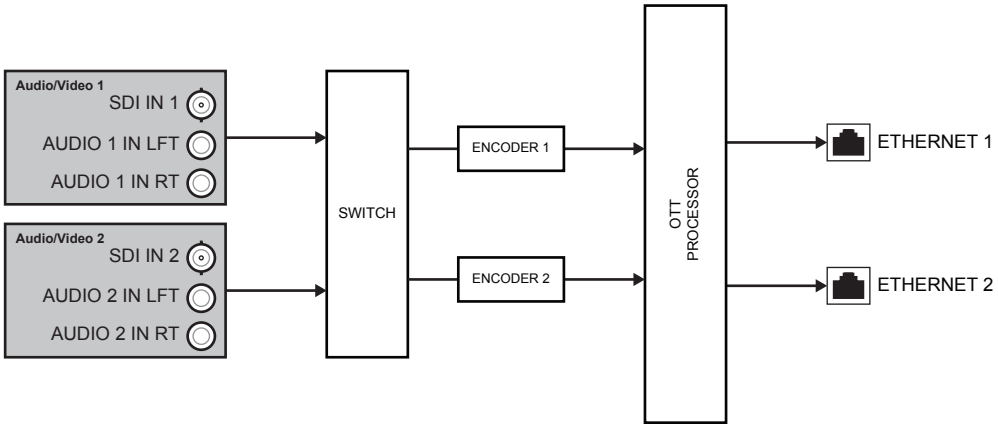


***Figure 1.2** Simplified Diagram — OTT Protocols*

User Interfaces

The following interfaces are available for control and monitoring of your encoder.

DashBoard Control System

DashBoard enables you to monitor and control openGear frames and cards from a computer. DashBoard communicates with cards in the openGear frame through the Network Controller card.

For More Information on...

- the menus in DashBoard, refer to the section "**Status Menus**" on page 11-1.
- installing and using DashBoard, refer to the ***DashBoard User Manual***.

Card-edge Monitoring

The card-edge provides LEDs for monitoring the status of the input signals, the output signals, and communication activity.

For More Information on...

- the card-edge LEDs, refer to the section "**Card-edge Monitoring Features**" on page 3-9.

Documentation Terms and Conventions

The following terms and conventions are used throughout this manual.

Terms

The following terms are used:

- "**Board**" and "**Card**" both refer to the MSE-8671 and MDE-8672, including all components and switches.
- "**CBR**" refers to constant bit rate.
- "**CDN**" refers to content distribution network.
- "**DashBoard**" refers to the DashBoard Control System.
- "**DF**" refers to Do-not-Fragment.
- "**DFR-8321 series**" refers to the DFR-8321 series frames and all available options unless otherwise indicated.
- "**DS**" refers to Differentiated Services.
- "**Encoder**" refers to the MSE-8671 and the MDE-8672 unless otherwise noted.
- "**MIB**" refers to management information base.
- "**MPTS**" refers to Multi-Program Transport Stream.
- "**openGear frame**" refers to the DFR-8321 series and OG3-FR series frames and all available options unless otherwise indicated.
- "**OG3-FR series**" refers to the OG3-FR series frames and all available options unless otherwise indicated.
- "**Operator**" and "**User**" both refer to the person who uses the encoder.
- "**PCR**" refers to program clock reference.
- "**PID**" refers to packet identifier.
- "**RTMP**" refers to Real Time Messaging Protocol.
- "**Stream**" refers to a transport stream present at the port.
- "**System**" and "**Video system**" both refer to the mix of interconnected production and terminal equipment in which the card operates.
- "**TOS**" refers to Type-Of-Service.
- "**TPG**" refers to Test Packet Generator.
- "**TTL**" refers to Time-To-Live.
- "**UDP**" refers to user datagram protocol.

Conventions

The following conventions are used:

- The "**Operating Tips**" and "**Note**" boxes are used to provide additional user information.

Before You Begin

In This Chapter

This chapter provides a general overview of the user controls available on your encoder.

The following topics are discussed:

- Using DashBoard
- Getting Started

Using DashBoard

Before proceeding, ensure that the DashBoard Control System is installed on a PC connected to your facility network. The DashBoard software and user manual area available from the Ross Video website.

For More Information on...

- installing DashBoard, refer to the ***DashBoard User Manual***.

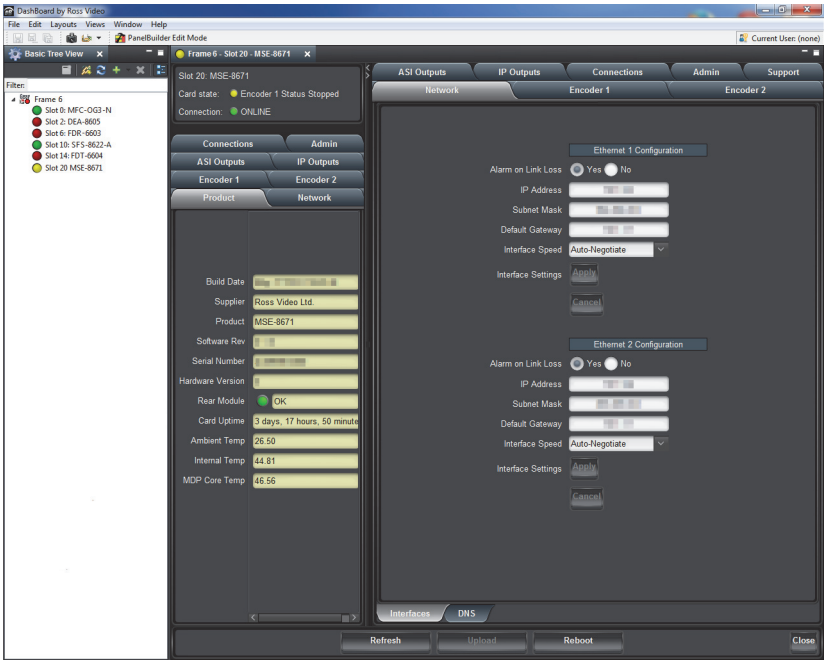
To launch DashBoard

1. Ensure that you are running DashBoard software version 6.2.0 or higher.
2. Launch DashBoard by double-clicking its icon on your desktop.
3. Ensure that the openGear frame with your encoder card(s) is displayed in the Tree View located on the left-side of the DashBoard window.

   It may take 30 seconds or more to update the Tree View. Consult the ***MFC-OG3 Series User Manual*** and ***DashBoard User Manual*** should the Tree View not display the card.

To access a card in DashBoard

1. From the **Tree View**, expand the node for the openGear frame your cards are installed in. A list of cards installed in the frame is now displayed. In the example below, the node for Frame 6 is expanded to show a list of cards including an MSE-8671.
2. Double-click the node for a card to display its menus in the **Device View** of DashBoard (right-side of the DashBoard window).

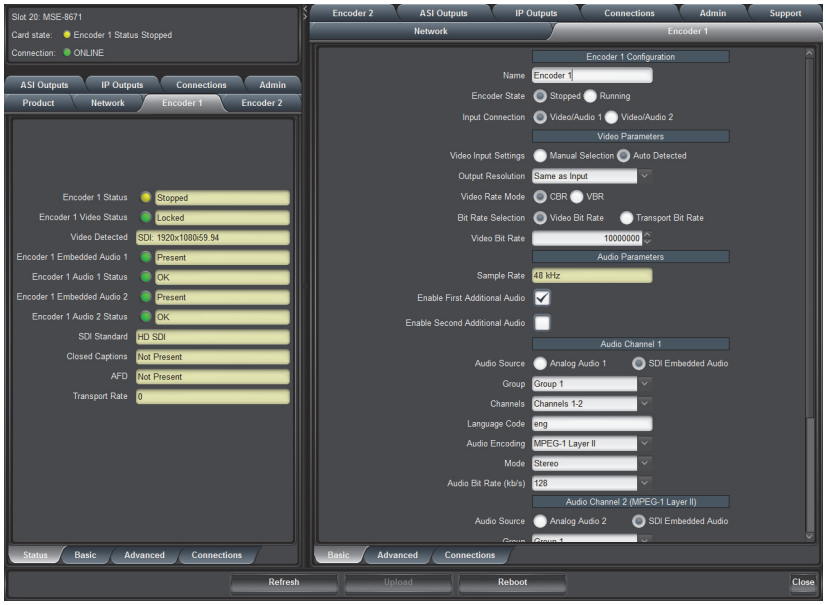


Example of an Encoder in DashBoard

Getting Started

You configure your encoder using the free DashBoard application, which is available from our website. The DashBoard user manual can also be downloaded from our website.

The encoder user interface is depicted below. It is divided into a status panel on the left, and a configuration panel on the right. Each panel has multiple tabs, corresponding to the various functions in the card. Note that the Card State alarm indicator is also reflected in the green/red Status LED in the front of the board. The Status LED will be green when Card State is green or yellow, and will be red when Card State is red.



Example of Encoder Interface in DashBoard

The following tabs are available:

- **Product** — This tab provides general information on the card, including firmware version, uptime, temperatures, and other parameters. It appears only on the Status area.
- **Network** — This tab is used to configure the IP addresses and network information for the Ethernet ports. The status tabs includes some additional information such as link state.
- **Encoder 1, Encoder 2** — These tabs are used to configure the two encoder channels.
- **ASI Outputs** — This tab is used to configure/monitor the ASI ports.
- **IP Outputs** — This tab is used to configure/monitor the IP Output ports. The configuration panel provides the facilities to create, manage and delete ports; the status tab includes transmission status information.
- **Connections** —This tab is used to configure/monitor connections. The configuration tab provides facilities to create, edit and delete connections; the status tab provides a table where the status of all the connections in the unit can be inspected at a glance.
- **Admin** — This tab is used for general administrative functions, such as firmware upgrades, licensing, logs, and configuration management. The Test Packet Generator configuration is also found under this tab.

Each tab is discussed in a separate chapter of this manual.

Installation

In This Chapter

This chapter provides instructions for installing the rear module for your encoder, installing the card in the frame, cabling details, and how to upgrade the software on your card(s).

The following topics are discussed:

- Before You Begin
- Installing the Encoder
- Cabling
- Card Overview
- Rear Module Monitoring Features
- Card-edge Monitoring Features

Before You Begin

Before proceeding with the instructions in this chapter, ensure that your openGear frame is properly installed according to the instructions in the manual that accompanied your frame.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each card you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video directly.

Installing the Encoder

The procedure for installing the rear module and card in your openGear frame. The encoder can be installed in the DFR-8321 series frames and the OG3-FR series frames using the supported rear module.

Important — *The encoder is incompatible with the MFC-8322-S. You must install the encoder in an openGear frame that includes an MFC-8322-N series or an MFC-OG3-N series Network Controller Card.*

Supported Rear Modules

The MSE-8671 supports the 8320AR-063 rear module.

The MDE-8672 supports the 8320AR-064 rear module.

Installing a Card

You must first install the rear module in the openGear frame and then install the card in the appropriate slot within the frame. This section outlines how to perform both tasks.

To install the rear module in the openGear frame

1. Refer to the frame manual to ensure that the frame is properly installed.
2. On the rear of the frame, locate the card frame slot.
3. Remove the Blank Plate from the rear of the slot you have chosen for card installation.
4. As shown in **Figure 3.1**, seat the bottom of the rear module in the seating slot at the base of the frame's back plane.

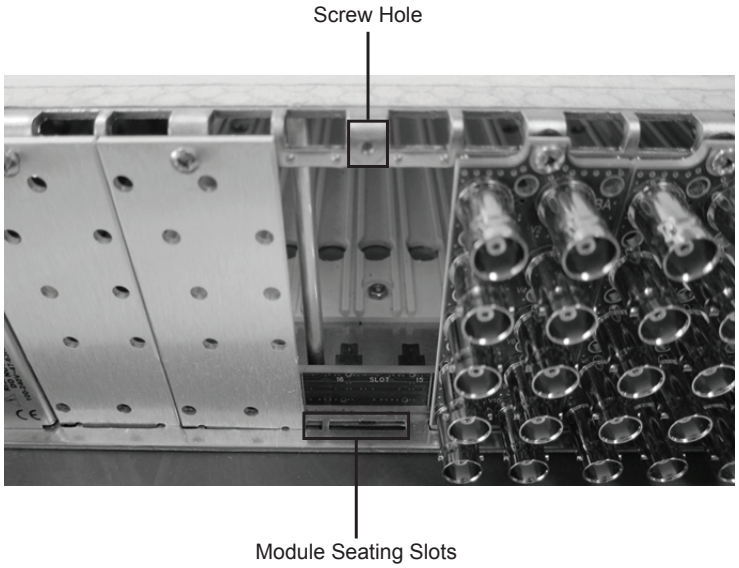


Figure 3.1 *Rear Module Installation in an OG3-FR Series Frame (Cards not shown)*

5. Align the top hole of the rear module with the screw hole on the top edge of the frame back plane.
6. Using a Phillips screwdriver and the supplied screw, fasten the rear module to the back plane. Do not over-tighten.

7. Verify whether your Rear Module Label is self-adhesive by checking the back of the label for a thin wax sheet. You must remove the wax sheet before affixing the label.
8. Affix the supplied Rear Module Label to the BNC area of the Rear Module.
9. Ensure proper frame cooling and ventilation by having all rear frame slots covered with rear modules or blank metal plates.

To install the card in the openGear frame

1. Locate the Rear Module you installed in the procedure "**To install the rear module in the openGear frame**" on page 3-3.
2. Hold the card by the edges and carefully align the card edges with the slots in the frame.
3. Fully insert the card into the frame until the rear connection plugs are properly seated on the midplane and rear modules.

Cabling

Each rear module occupies two slots and accommodates one card.

8320AR-063 and 8320AR-064 Rear Modules

These rear modules each provide two software-configurable Composite/SDI video inputs on BNC connectors, two ASI output ports on BNC connectors, four unbalanced analog audio inputs on RCA connectors, and two 100/1000 Mb/s Ethernet ports on RJ45 connectors. Refer to **Figure 3.2** for cabling designations.

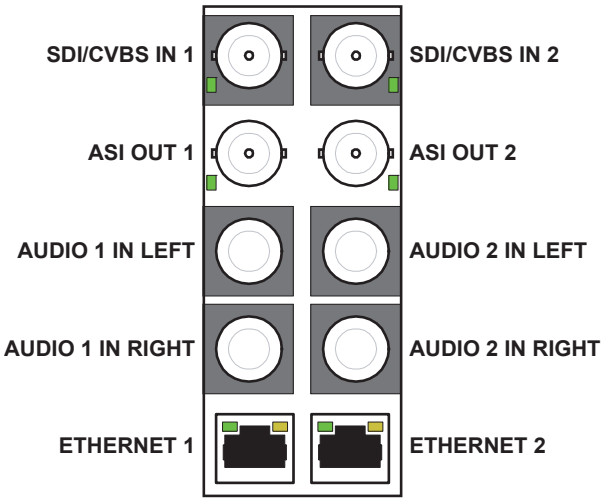


Figure 3.2 *Cabling — 8320AR-063 and 8320AR-064 Rear Modules*

Software Upgrades

The encoder can be upgraded in the field via the Network Controller card in your openGear frame. Note that DashBoard version 6.2.0 or higher is required for this procedure.

To upgrade the software on an encoder

1. Contact Ross Technical Support for the latest software version file.
2. Display the **Device View** of the card by double-clicking its status indicator in the **Basic Tree View**.
3. From the **Device View**, click **Upload** to display the **Select file for upload** dialog.
4. Navigate to the ***.bin** upload file you wish to upload.
5. Click **Open**.
6. If you are upgrading a single card, click **Finish** to display the **Uploading to Selected Devices** dialog. Proceed to step 8.
7. If you are upgrading multiple cards:
   - Click **Next >** to display the **Select Destination** menu. This menu provides a list of the compatible cards based on the card selected in step 2.
   - Specify the card(s) to upload the file to by selecting the check box(es) for the cards you wish to upload the file to.
   - Verify that the card(s) you wish to upload the file to. The **Error/Warning** fields indicate any errors, such as incompatible software or card type mismatch.
   - Click **Finish** to display the **Uploading to Selected Devices** dialog.
8. Monitor the upgrade.
   - The **Uploading to Selected Devices** dialog enables you to monitor the upgrade process.
   - Click **OK** to complete the upgrade.
   - The card(s) are temporarily taken off-line during the re-boot process. The process is complete once the status indicators for the **Card State** and **Connection** fields return to their previous status.

Card Overview

This section describes the buttons located on the card surface. There are no other card-edge controls as all configuration and setup is done using the menus in DashBoard.

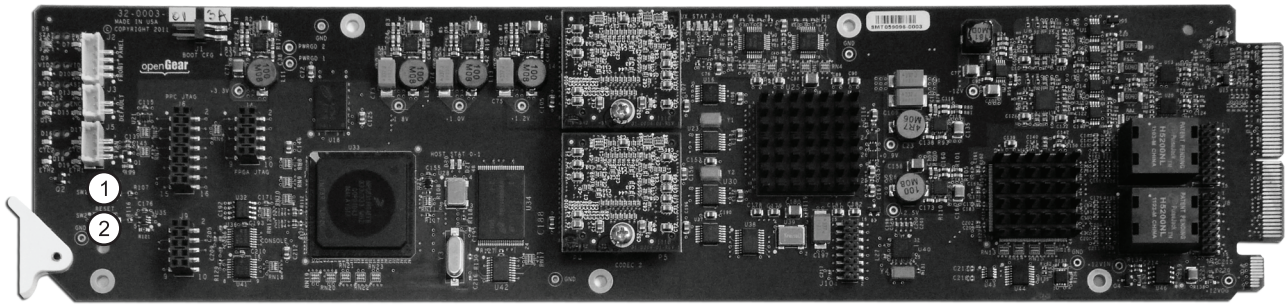


Figure 3.3 *Card-edge Controls*

1. Default Button

This switch is used to recover the board in the unlikely case of a corrupted or broken firmware update. In most cases, the encoder will detect the error and automatically fall back into the factory-default firmware load. If it does not, pull the card out, press and hold this switch, and push the card back into the frame while still holding the switch. You can release the switch once the **Status** LED turns orange. This action causes the card to revert to the factory-default firmware. Do not use this button unless advised by Ross Technical Support.

2. Reset Button

Pressing this push-button switch causes the card to reset.

Rear Module Monitoring Features

The following sections describe the rear module LEDs. Refer to **Figure 3.5** for LED locations.

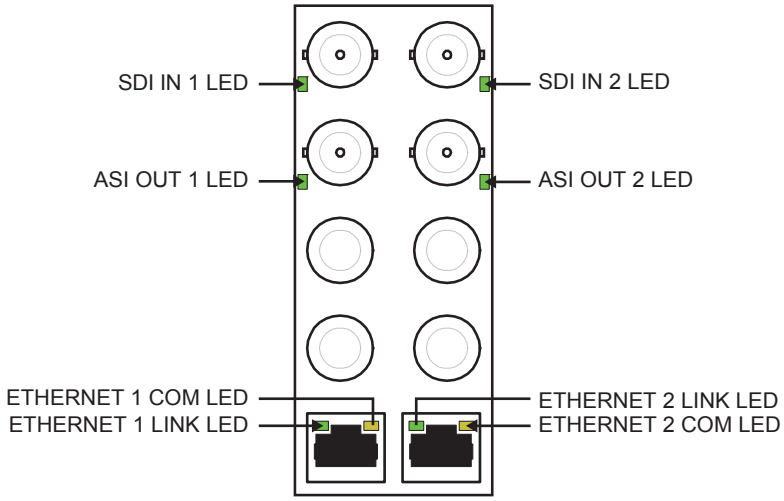

SDI IN 1 LED
SDI IN 2 LED
ASI OUT 1 LED
ASI OUT 2 LED
ETHERNET 1 COM LED
ETHERNET 1 LINK LED
ETHERNET 2 LINK LED
ETHERNET 2 COM LED

***Figure 3.4** LED Locations*

Status LEDs

Basic LED displays and descriptions are provided in **Table 3.2**.

Table 3.1 Status LEDs

LED	Color	Display and Description
SDI IN #	Flashing Green	When flashing green approximately once per second, this LED indicates the video input is locked to an SD-SDI video signal.
		When flashing green approximately twice per second, this LED indicates the video input is locked to an HD-SDI video signal.
	Off	When unlit, this LED indicates there is no video signal detected, or the input is not configured.
ASI OUT #	Flashing Green	When flashing green, this LED indicates the specified ASI output is configured and enabled.
	Off	When unlit, this LED indicates the specified ASI output is disabled.
ETHERNET # LINK	Green	When lit green, this LED indicates a valid link.
	Off	When unlit, this LED indicates an invalid or unavailable link.
ETHERNET # COM	Flashing Yellow	When flashing yellow, this LED indicates the specified port is currently transmitting and/or receiving.
	Off	When unlit, this LED indicates no activity is occurring on the specified port.

Card-edge Monitoring Features

The following sections describe the card-edge LEDs. Refer to **Figure 3.5** for LED locations.

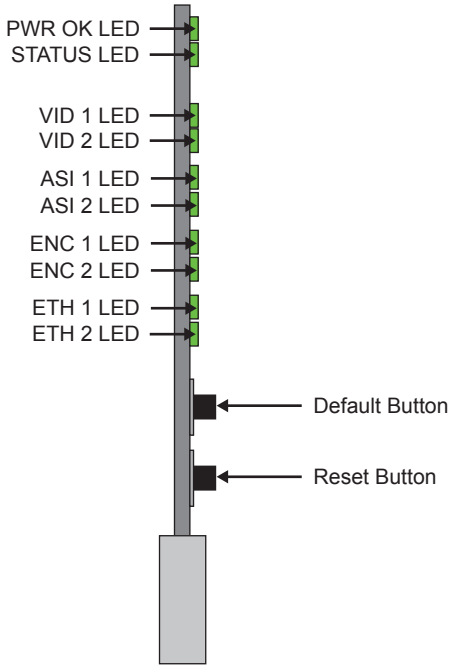


***Figure 3.5** LED Locations*

Status LEDs

Basic LED displays and descriptions are provided in **Table 3.2**.

Table 3.2 Status LEDs

LED	Color	Display and Description
PWR OK	Green	When lit green, this LED indicates that power is received from the openGear frame.
	Off	When off, this LED indicates the absence of power, or insufficient voltage. Verify the power status of the openGear frame.
STATUS	Green	When lit green, this LED indicates the encoder is operating without errors.
	Red	When lit red, this LED indicates that the encoder is experiencing at least one critical alarm. When inserting an encoder in the frame, this LED will be red until the board starts operation. At that point, it will turn green if there is no active alarm, or stay red if there is at least one alarm.
VID #	These LEDs report the same information as the SDI IN LEDs on the rear module.	
ASI #	These LEDs report the same information as the ASI OUT LEDs on the rear module.	

Table 3.2 Status LEDs

LED	Color	Display and Description
ENC#	Green	When not flashing, these LEDs indicate the encoder is stopped (either by explicit configuration or by lack of input) or if it is in one of the Web streaming modes (HTTP Live Streaming or Direct HTTP Streaming).
	Flashing Green	When flashing, these LEDs indicate the corresponding encoder is running, with output available for routing to ASI, UDP or RTP.
ETH #	Green	When lit green, these LEDs indicate a valid ethernet connection and but there is no communication activity occurring.
	Flashing Green	When flashing green, these LEDs indicate a valid ethernet connection and the specified port is transmitting and/or receiving packets.
	Off	When unlit, these LEDs indicate the absence of a valid ethernet connection.

Network Tab

In This Chapter

The **Network** tab allows for configuration/monitoring of the two streaming Ethernet ports, and optional configuration of DNS servers. The **Network** tab is further divided into two sub-tabs: Interfaces, and DNS. This chapter discusses both sub-tabs and the status tab.

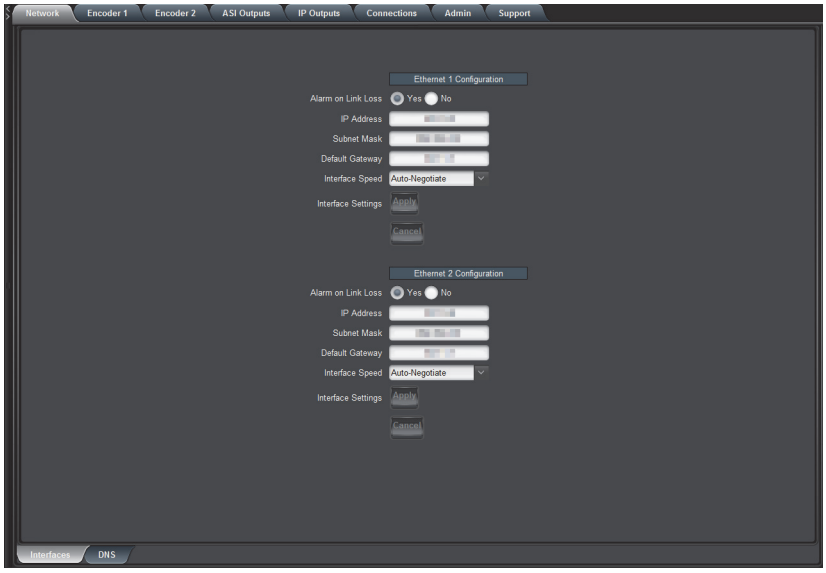
The following topics are discussed:

- Interfaces Tab
- DNS Tab

Interfaces Tab

The **Interfaces** tab is used to set the individual parameters for each of the streaming Ethernet ports. The encoder ethernet interfaces support two manual modes: 100Mbps Full-Duplex, and 1Gbps Full-Duplex.

Note — *Support for 10Mbps and Half-Duplex modes are disabled as these are unsuitable for MPEG transport over IP applications.*



Network Tab — Interfaces Tab

Alarm on Link Loss

Choose one of the following:

- **Yes** — Encoder raises an alarm if this Ethernet interface loses link. The **Card State** indicator in DashBoard and the front **Status** LED will both be red. It is recommended to enable the alarm for ports that are in use.
- **No** — Encoder will still report loss of link in the status tab but no alarm will be raised. It is recommended to disable the alarm only if you do not plan to connect the port to a network.

IP Address

Sets the IP address of the specified port.

Subnet Mask

Sets the subnet mask of the specified port.

Default Gateway

Sets the default gateway for the specified port. Use 0.0.0.0 if no gateway is available.

Interface Speed

Choose one of the following:

- **Auto-Negotiate** — The specified port auto-negotiates the speed.

- **100Mb/s Full-Duplex** — Forces the port to 100Mbps Full-Duplex mode. The port still performs auto-negotiation, but it will only display this mode.
- **1Gb/s Full-Duplex** — Restricts the operation to 1Gbps Full-Duplex mode. The port still performs auto-negotiation, but it will only display this mode.

Interface Settings

Choose one of the following:

- **Apply** — Select if you have made changes to the fields in the **Interfaces** tab. Notice that the buttons are grayed out if no changes are made. Once the **Apply** button is selected, a status message displays just below the **Cancel** button.
- **Cancel** — Reverts the fields back to the last saved values.

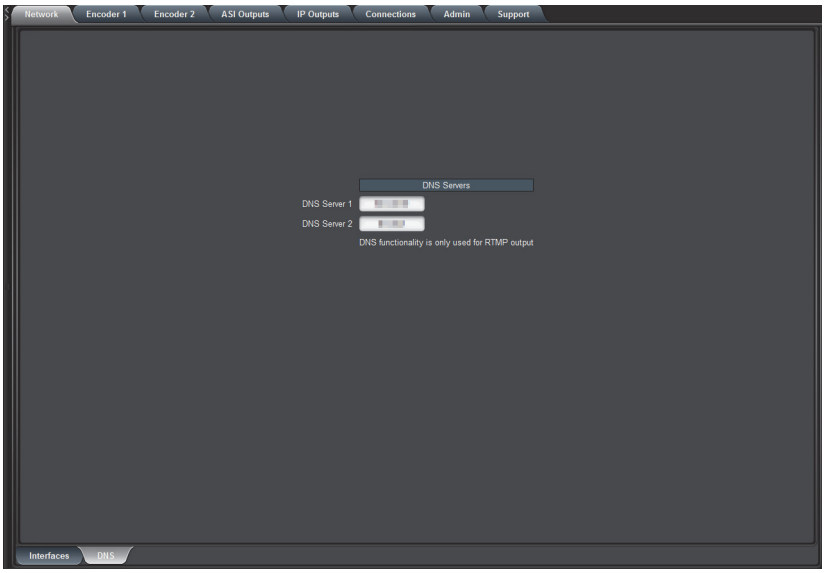
Notes

Keep the following in mind when configuring the streaming ports:

- The encoder checks the consistency of the data entered and rejects invalid combinations (e.g. combinations where the gateway is outside the interface subnet).
- If the encoder streaming Ethernet interfaces are connected to a 10Mbps switch, hub, or network feed, link will not be established and the port will not recognize the connection.
- If you select **100Mb/s Full-Duplex** or **1Gb/s Full-Duplex** and the corresponding streaming Ethernet interface is connected to a switch, hub or network feed that does not support the selected speed, link will not be established and the port will not recognize the connection.
- If the interface speed is set to **Auto-Negotiate**, the streaming Ethernet port will allow link to be established in 100Mb/s Half-Duplex mode. However, this will be flagged as a warning in the **Network** status tab and in the **Admin Event Log** tab.

DNS Tab

The **DNS** tab is used to optionally configure DNS servers.



Network Tab — DNS Tab

The **DNS** tab allows manual configuration of up to two DNS servers. They do not need to be in the same subnetwork as the streaming ports, as long as at least one default gateway is configured. DNS is only used in conjunction with the RTMP output functionality. If you are not using RTMP, there is no need to configure DNS servers.

DNS server configuration takes effect immediately, as soon as the information is entered.

For More Information on...

- the network status tabs, refer to the section "**Network Status Tabs**" on page 11-3.

Encoder Setup

In This Chapter

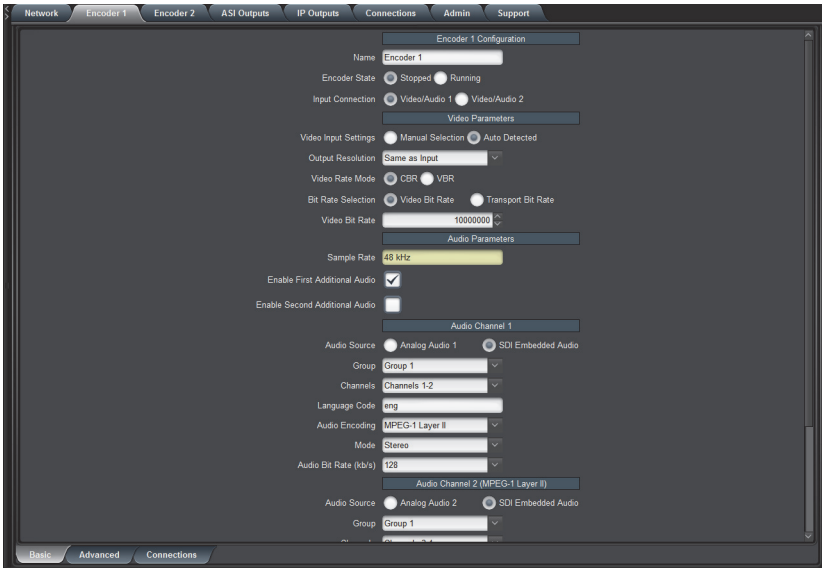
Each **Encoder** tab is divided into the following sub-tabs: Basic, Advanced, and Connection. This chapter discusses the function and options of each tab.

The following topics are discussed:

- Configuration Overview
- Video Input Auto-Detection
- Multiple Audio Support
- Selecting an Output Resolution
- Using the Basic Tab
- Using the Advanced Configuration Tab
- Using the Encoder Connections Tab
- HTTP Live Streaming
- Direct HTTP Streaming
- Real Time Messaging Protocol

Configuration Overview

The MSE-8671 can be configured with one encoder channel while the MDE-8672 includes two channels (at the time the unit is ordered, factory installed). If an encoder channel is not installed, both its configuration and status windows will be empty.



Encoder 1 Tab — MSE-8671

Each **Encoder** tab is divided into the following sub-tabs:

- **Basic** tab — contains the more important configuration parameters, which all users are likely to change.
- **Advanced** tab — contains the advanced configuration parameters, which do not necessarily need to be changed.
- **Connections** tab — allows the creation of connections between this encoder and the ASI and IP output ports.

In general, the encoder user interface will change as a function of the parameter selections made, to remove illegal parameter combinations.

Selections made in any of the encoder configuration tabs do not take effect until the **Apply** button is pressed. If you wish to discard the changes made to the user interface, press the **Cancel** button. The **Apply**/**Cancel** buttons are present in all the tabs and will be grayed out until changes are made. At any given point in time, the currently running encoder configuration can be inspected in the **Encoder** status tab, described the section "**Encoder Status Tabs**" on page 11-5.

Using the Apply/Cancel Buttons

The **Apply**/**Cancel** buttons are available at the bottom of the Basic, Advanced, and Connection tabs. These are not separate buttons - they are multiple instances of the same buttons, repeated on each tab for convenience. Thus changes made on the Basic tab can be applied, or canceled, on the Connection tab. This allows all tabs to be updated to a new configuration, then send all three tabs of changes with one button press. If no changes have been made to the settings, the **Apply**/**Cancel** buttons are grayed out; once any changes are made, they become available. Changes do not take effect until the Apply button is pressed. If you make changes but decide not to apply them, click on the Cancel button and the user interface reverts to where it was before. Once you click on the Apply button, the changes are implemented.

In general, most changes will cause the encoder channel to stop and start again, causing a brief (2-second) interruption to the stream. Changes to the following parameters are implemented on-the-fly, without stopping the encoder:

Table 5.1 Applying Changes

Tab	Menu Item	Parameter
Basic	Audio Configuration	Audio Source
		Language Code
Advanced Tab	VBI/Ancillary Data Insertion	Any CC/AFD configurations
	Analog Audio Parameters	Audio Gain L/R
		Audio Mute L/R
	PMT Information	Audio Type and Dolby PMT Type
	Mux Parameters	Transport Stream ID
		Enable SDT and all the SDT parameters
	ASI/IP Streaming	Any connections made
	Secondary Audio PID changes in Encoder 1 when Secondary Audio is enabled	

Video Input Auto-Detection

The encoder can be set to auto-detect the video input signal, and self-configure for the incoming resolution and frame rate. This feature allows the encoder to operate in situations where the video signal can change over time (for example, at the output of a video router). The encoder is also capable of automatically recognizing whether a signal is SDI or composite, and the video standard for composite signals.

The following points should be considered when using video input auto-detection:

- The available output scaling options are limited, since some options are specific to some input resolutions.
- If the encoder is not licensed for a given configuration, it will stop encoding if the input video signal switches to a value that requires this configuration. For example, an SD encoder configured to output the same resolution as the input will stop if the input signal switches to HD.
- If the encoder is configured with auto-detection and SDI embedded audio, it will fall back to analog audio if it detects a composite video signal. If your input can switch between SDI and composite, either use analog audio for all signals, or make sure that the corresponding analog audio signal is present at the encoder unbalanced audio inputs when the video is a composite signal.

Multiple Audio Support

The encoder can be licensed to offer up to two additional MPEG-1 Layer II audio channels, regardless of the number of installed encoders. These additional audio channels can be associated with the first or second encoder. Moreover, a dual-channel encoder can be configured as a single-channel encoder with combined audio. The following combinations are supported:

MSE-8671 Encoders

Support for 1, 2 or 3 audio stereo pairs, as follows:

- First stereo pair:
  - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
  - › Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)
- Second stereo pair:
  - › MPEG-1 Layer II support only
  - › Valid inputs: second analog unbalanced audio, SDI embedded (SDI signals only)
- Third stereo pair (only available for SDI inputs):
  - › MPEG-1 Layer II support only
  - › Valid input: SDI embedded

MDE-8672 Encoders

Support for 1 or 2 audio stereo pairs per encoder channel, as follows:

- First stereo pair:
  - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
  - › Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)
- Second stereo pair (only available for SDI inputs):
  - › MPEG-1 Layer II support only
  - › Valid input: SDI embedded

Dual channel encoders can be configured to have one encoder channel with 3 audio stereo pairs, and another encoder channel with 1 audio stereo pair, as follows:

- Encoder with 1 stereo pair:
  - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
  - › Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)
- Encoder with 3 stereo pairs:
  - › First stereo pair: MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support. Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)
  - › Second stereo pair (only available for SDI inputs): MPEG-1 Layer II support only. Valid input: SDI embedded.
  - › Third stereo pair (only available for SDI inputs): MPEG-1 Layer II support only. Valid input: SDI embedded.

Dual channel encoders with combined audio: support for up to 4 audio stereo pairs per board, as follows:

- First stereo pair:

    - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
    - › Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)
- Second stereo pair:
    - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
    - › Valid inputs: second analog unbalanced audio, SDI embedded (SDI signals only)
- Third stereo pair (only available for SDI inputs):
    - › MPEG-1 Layer II support only
    - › Valid input: SDI embedded
- Fourth stereo pair (only available for SDI inputs):
    - › MPEG-1 Layer II support only
    - › Valid input: SDI embedded

Selecting an Output Resolution

You can set the Video Input Settings to either Manual Selection or Auto Detected. This section outlines both options.

Manual Selection

If **Video Input Settings** is set to **Manual Selection**, the following resolutions are displayed in the **Output Resolution** menu:

- Same as the input (no scaling)
- ¾ scaling from the input
- Low resolutions: 480x270, 320x240, and 320x180, progressive, at half and quarter frame rates
- HD inputs can be scaled (and re-interlaced if necessary) to SD resolution, anamorphic
- 720p inputs can be reduced to half frame rate (typically for Internet applications), as follows:
  - 1280x720p50 is converted to 1280x720p25
  - 1280x720p59.94 is converted to 1280x720p29.97
  - 1280x720p60 is converted to 1280x720p30
- 1080i, 720p and SD inputs can be converted to SD resolution, with progressive frame rates (ideal for computer displays), as follows:
  - 1080i59.94, 720p59.94, and 480i59.94 are converted to 720x480p29.97
  - 1080i60 and 720p60 are converted to 720x480p30
  - 1080i50 and 720p50 are converted to 720x576p25

  The conversions from HD resolutions are done using anamorphic scaling.
- 1080i, 720p and SD[1] inputs can be scaled to 640x360, with progressive frame rates, as follows:
  - 1080i59.94 and 480i59.94 are converted to 640x360p29.97
  - 720p59.94 is converted to 640x360p59.94
  - 1080i50 and 576i50 are converted to 640x360p25
  - 720p50 is converted to 640x360p50
- HD 1080i inputs can be scaled to 1280x720p at the same incoming frame rate (e.g. 1080i 59.94 will be scaled to 720p 29.94; 1080i 50 will be scaled to 720p 25).
- HD 1080i inputs can be scaled to ¼ resolution (960x540), with the same incoming frame rate
- SD inputs can be horizontally cropped to 704 pixels or horizontally scaled to 640 pixels
- SD inputs can be horizontally scaled to 640 or 528 pixels, and converted to progressive frame rates (29.97p for NTSC inputs, 25p for PAL inputs)

1. By default, SD signals have a 4:3 aspect ratio, unless they are derived from an HD source with anamorphic scaling. The 640x360 resolution is intended for 16:9 content. Scaling SD to 640x360 should only be done if the SD signal is anamorphic to start with, otherwise the resulting encoded signal will have an incorrect aspect ratio.

Auto Detected

If **Video Input Settings** is set to **Auto Detected**, the following options are displayed in the **Output Resolution** menu:

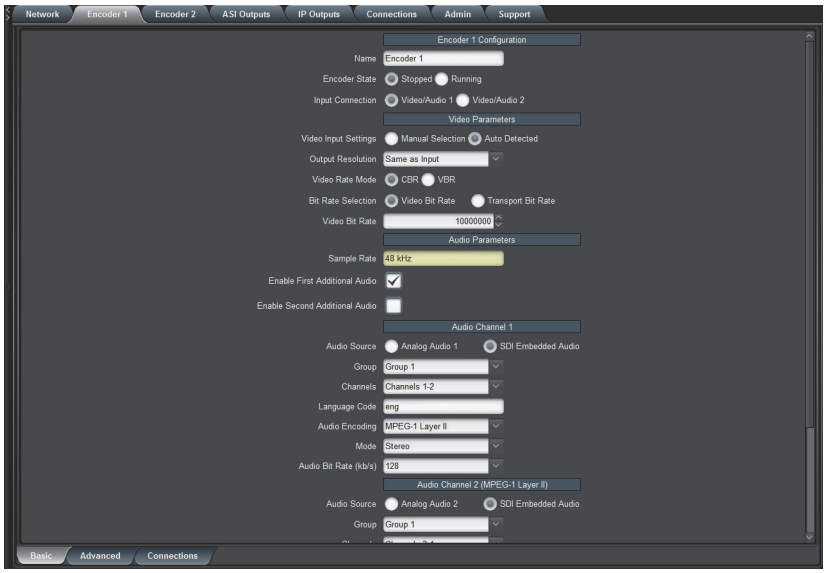
- Same as Input: the encoder will produce a signal that has the same resolution and frame rate as the input (no scaling).
- Scale 3/4 Horizontal: the encoder will scale down the image horizontally by 3/4. The frame rate will not be changed.
- Scale to 640x360p: the encoder will scale the input video to 640x360. The frame rate will be the same as the input, but interlaced inputs will be de-interlaced (for example, 1920x1080i60 will yield 640x360p30).
- Scale to 480x270p, Scale to 320x240p, Scale to 320x180p: the encoder will scale the input video to the selected resolutions. Interlaced inputs will be de-interlaced as described above. Progressive inputs will be encoded at half frame rate.

Using the Basic Tab

The **Encoder 1** and **Encoder 2** tabs are used to configure/monitor the individual encoder channels. The parameters in these two tabs are exactly the same.

For More Information on...

- on the supported input video signals, refer to the section "**Supported Input Video Signals**" on page 1-3.



Encoder 1 — Basic Tab

The **Basic** sub-tab is divided into three general areas:

- **Encoder Configuration** — generic configuration parameters.
- **Video Parameters** — parameters related to video encoding. The encoder is capable of automatically identifying the video signal present in the selected input connection. The detected signal is reported in the **Encoder** status tab. Additionally, the encoder can also be set to auto-configure its input based on the detected signal
- **Audio Parameters** — parameters related to audio encoding.

The **Basic** sub-tab parameters change (or appear/disappear in the GUI) based on the device's configuration and the parameter choices made.

Encoder Configuration

This area of the Basic tab provides generic configuration options.

Name

All encoder encoders and outputs can be assigned a user-defined name. This name is used to identify the encoder later when making connections. Use any descriptive name suitable for your application, or accept the default.

Encoder State

Allows you to start/stop an encoder. This control needs to be set to Running for normal operation.

Input Connection

Selects which of the two rear module inputs is to be connected to this encoder. The encoder can run both encoders from the same input.

The default is to run Encoder 1 from Video/Audio 1 and Encoder 2 from Video/Audio 2, but all combinations are allowed.

The options presented in the Video Parameters area section may change if this selection changes (e.g. if you switch the encoder from a Composite input to an SDI input).

Video Parameters

The Video Parameters area provides options for setting up the video encoder features.

Video Input Settings

Choose one of the following:

- **Manual Selection** — The input signal must be correctly selected using the Input Resolution, Input Source, and Field/Frame Rate controls for the encoder to run. If the input signal does not match the settings, the encoder will not run.
- **Auto Detected** — The encoder will auto-detect the input signal, and automatically configure for it if it is a supported signal. The Input Resolution, Input Source, and Field/Frame Rate controls are not displayed.

Input Resolution

Select the resolution of the input video signal. The following options are available: SD: 720x480i[1], HD: 1280x720p, and HD: 1920x1080i.

Input Source

Select the input source type. This control is available only if the Input Resolution is set to SD. In this case, the options will be Composite or SD-SDI.

If the Input Resolution is set to any of the HD values, this control will not be selectable, and will show the appropriate type of input: HD-SDI for 1280x720p and 1920x1080i.

Field/Frame Rate

Select to match your source. For all input resolutions, the supported options always include 59.94 (for NTSC-based systems) and 50 (for PAL-based systems). Some resolutions have support for additional frame rates, as follows:

- If you select the 1920x1080i or 1280x720p resolutions, this field will also include an option for a field rate of 60, used by same cameras.
- If you select the 1920x1080p resolution, this field will also include an option for a frame rate of 23.98 (Film).

Output Resolution

Select the desired output resolution. The values in this drop-down list are a function of the Video Input Settings, the Input Resolution and the Frame/Field Rate. Note that some resolutions require additional licensing for the encoder.

Refer to the section "**Selecting an Output Resolution**" on page 5-7 for details.

1. This will be displayed as 720x576i if the Field/Frame Rate is set to PAL.

Video Rate Mode

Controls whether the video elementary stream is CBR or VBR. The video bit rate setting varies according to this selection.

Bit Rate Selection

This field is shown only if the encoder is set to CBR mode, and allows the user to specify either the video bit rate, or the transport bit rate. The transport bit rate includes audio, video, tables, NULL packets, and various overheads. In some situations, such as for example, RF links of fixed capacity, it is more convenient to specify the transport rate (i.e., the final bit rate "in the wire"), and let the encoder compute the corresponding video bit rate to yield the desired transport rate. In other situations, such as IPTV deployments, it is more convenient to simply specify the video bit rate and let the encoder compute the final transport rate. Note that this control is not available in the OTT protocol modes.

Transport Bit Rate, Video Bit Rate

This field is displayed only if the encoder is set to CBR mode and the Bit Rate Selection control is set to Video Bit Rate. It determines the video elementary stream bit rate, expressed in bits/second. Note that the bit rate resolution is 1000bits/second.

Transport Bit Rate

This field is shown only if the encoder is set to CBR mode and the Bit Rate Selection control is set to Transport Bit Rate. It determines the overall transport stream bit rate, with a resolution of 1000 bits/sec; the encoder will calculate the appropriate video bit rate the yield the desired transport rate. Note that not all transport rates are achievable; in particular, the encoder may not be able to achieve very low transport rates if the audio bit rates are high. In these cases, the actual transport rate output by the encoder will be higher than the configured value. The actual transport rate is displayed in the Encoder status tab, after the Apply button has been pressed. At that point, the actual encoder video bit rate can be found in the Encoder status tab, under the Basic bottom tab.

Peak Video Bit Rate, Average Video Bit Rate

These two fields are shown only if the encoder is set to VBR mode, and determine the desired average and acceptable peak bit rates for the video elementary stream. The peak video bit rate must be between 1.5 and 2 times the average bit rate; the user interface will enforce these limits automatically (i.e., it will update either the average or peak to be consistent with the value being entered). For both of these parameters, the resolution is 1000bits/sec.

Audio Parameters

The Audio Parameters area provides options for configuring the audio encoding features.

Sample Rate (read-only)

This field is for information purposes only. The encoder only supports 48kHz audio sample rate.

Audio Source

This parameter selects the audio source. The options are Analog Audio, directing the encoder will to use the analog right/left audio channels connected to the selected rear I/O panel, and SDI Embedded Audio, directing the encoder to extract embedded audio from the SDI input. If the video Input Source (refer to the section "**Using the Basic Tab**" on page 5-9) is set to Composite, this parameter is grayed out and forced to Analog Audio. It will be selectable only if the video

input source is one of the SDI variations, or if Video Input Settings is set to Auto Detected. Please note that if the encoder is set to auto-detect the video input, and it detects a composite signal, the audio selection will fall back to analog audio regardless of the Audio Source settings. When SDI Embedded Audio is selected, additional configuration options become available.

Group and Channels

SDI embedded audio is typically divided into four groups (denoted by Group 1 to Group 4); each group has four mono channels (2 stereo pairs), denoted by Channels 1-2 and 3-4. These controls allow the selection of the desired group and channel pair. In the large majority of the cases, the first stereo pair is in Group 1, Channels 1-2, the second stereo pair is in Group 1, Channels 3-4, and so on. Selection has one additional choice, labeled Custom DID. This allows the encoder to use a non-standard embedded audio DID (this quite uncommon). If Custom DID is selected, a new configuration option becomes available, where the DID value can be entered.

Group DID

Enter the desired Group DID, in hexadecimal. Note that the entry will be immediately validated and rejected if invalid. As a reference, **Table 5.2** contains the standard DIDs built into the system for Groups 1 to 4.

Table 5.2 Standard DIDs for Groups 1-4

Group	SD-SDI DID	HD-SDI DID
1	0x2FF	0x2E7
2	0x1FD	0x1E6
3	0x1FB	0x1E5
4	0x2F9	0x2E4

Language Code

This parameter represents the 3-letter ISO 639-2 language code for the audio, to be placed in the audio language descriptor in the PMT. If the Output Protocol in the Encoder Connections tab is set to RTMP, this field will not be displayed as RTMP does not use the transport stream container.

Audio Encoding

This parameter selects the audio encoding algorithm. The available choices depend on the Audio Source selection. For Analog Audio, the choices are MPEG-1 Layer II and AAC-LC. For SDI Embedded Audio, the Dolby® Pass-through option is offered in addition to the previous choices. Note that AAC-LC requires additional licensing.

If the Output Protocol in the Encoder Connections tab is set to RTMP, this field is forced to AAC-LC and becomes not editable. The reason is that the RTMP protocol has no support for MPEG-1 Layer II audio at 48kHz sampling. It also has no support for Dolby®.

Mode

The available choices for this parameter depend on the Audio Encoding selection, as follows:

- **MPEG-1 Layer II** — the available modes are Stereo or Single Channel. If you select Single Channel (Mono), only the audio connected to the Left input will be encoded.
- **AAC-LC** — the available modes are Stereo, Mono, or Dual Mono. If you select Mono, only the audio connected to the Left input will be encoded.
- **Dolby® Pass-through** — this parameter is not displayed.

Audio Bit Rate

The format of this parameter is a function of the Audio Encoding setting. For MPEG-1 Layer II, this parameter is a drop-down list of valid discrete bit rates; the values in the list are also a function of the Mode Setting. For AAC-LC, the range is 112 to 512kbps for Stereo and Dual Mono, and 56 to 256kbps for Mono. This parameter is not displayed for Dolby® Pass-through as the encoder will automatically detect the incoming audio bit rate.

Peak Audio Bit Rate

This parameter is only displayed for AAC-LC. It must be set at least 1kbps higher than the Audio Bit Rate. The maximum value is 288kbps for Mono, and 576kbps for Stereo and Dual Mono.

Sample Rate

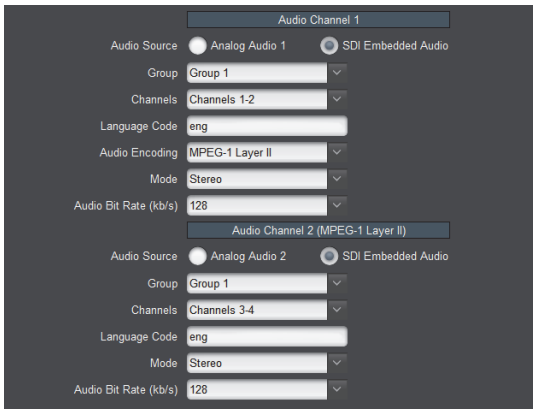
This field is for information purposes only. The encoder only supports 48kHz audio sample rate.

Additional Audio Support

If the encoder is in a configuration where additional audio channels can be offered, a check box to enable them will be presented in the GUI.

If the box is checked, additional fields will become available for configuring the additional audio channel. These fields are the same as with the first audio channel. Note that, depending on the configuration, the Audio Source selection may be grayed out.

After the first additional audio is enabled, the encoder may offer a second additional audio channel, as depicted below:



Audio Parameters — Additional Audio Channel

The second additional audio option will be offered in the following conditions:

- In a single-channel encoder, if the input signal type is SDI.
- In a dual-channel encoder, if the first additional audio is not being used by the other encoder channel.
- In a dual-channel encoder, if secondary audio is enabled.

Additional audio channels are only available if the **Output Protocol** in the **Encoder Connections** tab is set to **ASI/IP Streaming**.

Secondary Audio Support

A dual-channel encoder can be configured to offer secondary audio support (i.e., a second audio PID in the same program). If this function is available, it will be available in the audio section of Encoder 1.

Secondary audio support is only available if the **Output Protocol** in the **Encoder Connections** tab is set to **ASI/IP Streaming**.

When **Secondary Audio** is set to **Enabled**, the Encoder 1 Audio Configuration section will update.

The individual controls work in the same manner as discussed before. Each audio channel can be independently configured. As before, the SDI Embedded Audio option will only be available if the Encoder 1 input selection is one of the SDI variants. The only input restriction is that, when using Analog Audio, the signal connected to Video/Audio 1 will be the first audio channel, and the signal connected to Video/Audio 2 will be the second audio channel.

Secondary audio support can be combined with the two additional audio channels to create one program with up to 4 audio services (i.e., up to 4 audio PIDs).

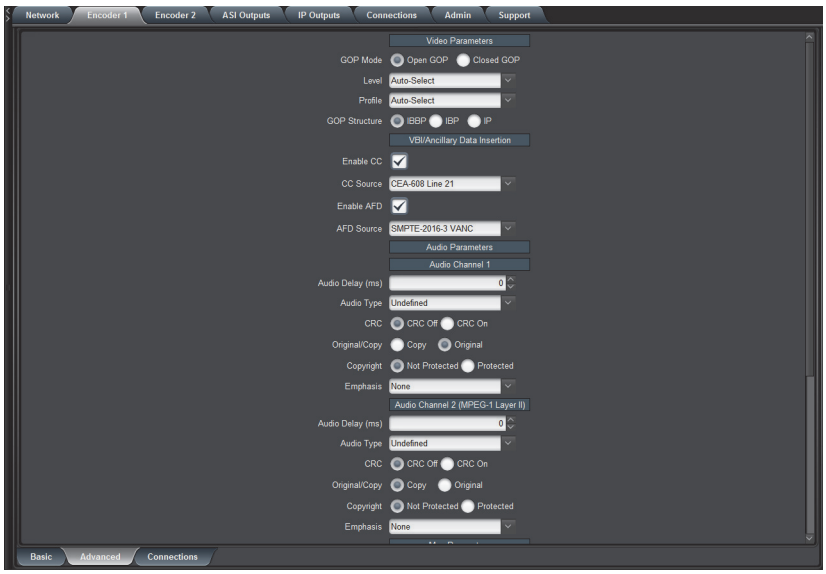
Support for secondary audio requires that both encoder channels in the board be tied together. Then the Secondary Audio control depicted above is set to Enabled, Encoder 2 will be slaved to Encoder 1.

The operation is as follows:

- The Encoder State, Input Selection, Video Input Settings, Output Resolution and Coding Delay (in the Advanced tab) controls are slaved to the corresponding controls in Encoder 1. They will reflect the state of their Encoder 1 counterparts.
- If Video Input Settings in Encoder 1 is set to Manual Selection, the Input Resolution, Input Source and Field/Frame Rate controls are shared with Encoder 1, and apply to whatever input port is selected. Changes here will be mirrored in the corresponding parameters for Encoder 1. If Video Input Settings in Encoder 1 is set to Auto Detected, these controls are not displayed.
- Encoder 2 can optionally share one or both audio channels from Encoder 1. This is accomplished by checking Include Audio Ch1/2 boxes in the Audio Insertion Controls displayed above.

Using the Advanced Configuration Tab

The appearance of the Encoder Advanced Configuration tab is a function of the choices made in the Encoder Basic Configuration tab.



Advanced Configuration tab

The options in the Advanced sub-tab are organized into four areas:

- **Video Parameters** — these are advanced controls related to the encoding of the video.
- **VBI/Ancillary Data Insertion** — controls related to Closed-Captioning insertion and Active Format Description (AFD) insertion.
- **Audio Parameters** — these are advanced controls related to the audio subsystem.
- **MUX Parameters** — these are advanced controls related to audio/video multiplexing and (P)SI tables.

Video Parameters

The Video Parameters area provide advanced video encoding options.

GOP Mode

Select between Open GOP (default) and Closed GOP.

Closed GOP is used for some storage applications, and is also required by some content distribution networks (CDN) such as the YouTube™ video community; there is a very small negative impact in video quality if Closed GOP is selected. For some output protocols (HLS and RTMP), this control becomes read-only and is forced to Closed GOP.

Level

Selects the H.264 level signaled in the bit stream. The default setting is Auto-Select, whereby the encoder will signal the minimum required level based on the current settings. If, for some reason, a different (higher) level is desired, it can be selected here. Note that the encoder will not honor a level selection that is lower than the legal minimum for the current settings. It is typically not necessary to change the level from Auto-Select.

Profile

Note — *As the profile is lowered, there will be video quality degradation. In other words, for a given resolution and bit rate, the video quality for High Profile will be better than Main Profile and Main Profile will be better than Baseline Profile. Whether the quality difference is noticeable will depend on the resolution, and specific video content.*

Choose one of the following:

- **Auto-Select** — With this setting, the encoder will use High Profile for HD and Main Profile for SD.
- **High Profile** — With this setting, the encoder will always use High Profile for all resolutions.
- **Main Profile** — With this setting, the encoder will always use Main Profile for all resolutions.
- **Baseline Profile** — The encoder will always use Baseline Profile. The GOP Structure control will not be selectable in Baseline Profile and will be set to IP.

Aspect Ratio

The H.264 bit stream includes aspect ratio information in the VUI Parameters as part of the Sequence Parameter Set. Normally, the encoder will automatically set the correct aspect ratio code. However, in some situations, it may be necessary to override this (for example when scaling HD to SD). Use this control to override the default aspect ratio set by the encoder. In particular, if the video input is 1920×1080i, and the content is being scaled to SD, use either 16:11 (PAL Widescreen) or 40:33 (NTSC Widescreen) to get the correct aspect ratio.

GOP Structure

Select between IBBP, IBP and IP. Selecting IBBP gives the best video quality, but some low-end decoders require IP. If Profile is set to Baseline Profile, this control will not be selectable and will be forced to IP.

Coding Delay

This parameter controls the size of the H.264 Coded Picture Buffer (CPB) expressed in milliseconds. This is one component of the end-to-end encoder/decoder delay. The encoder latency is 150ms plus the value of this control. For example, if the Coding Delay is set as its default value of 500ms, the encoder latency will be 650ms. Note that the overall encoder/decoder latency is also a function of the latencies in the decoder.

Important — *Reducing the coding delay will reduce latency at the expense of video quality.*

Use VBR if at all possible when reducing the latency, and set the peak rate as high as you can afford. For example, if the encoder output is 1920×1080i, a bit rate on the order of 10 to 12Mb/s (either CBR average or VBR peak) is required to product a stream without artifacts with a Coding Delay of 100ms.

Notes on Resolution Settings

Keep the following in mind when configuring resolution settings:

- If the Output Resolution setting in the Basic tab - Video Configuration is set to one of the low resolutions (480×270, 320×240, or 320×180), the Profile and GOP Structure controls will not be selectable.

- If the Input Resolution setting in the Basic tab - Video Configuration is set to 1920×1080p, the Profile and GOP Structure controls will not be selectable.

VBI/Ancillary Data Insertion

The encoder can extract the following data types from the video input and insert them in the compressed video output: Closed Captioning or Active Format Description (AFD).

Closed Captioning

The Closed Captioning controls are only displayed in the following situations:

- In the Video Configuration section of the Basic tab, the **Video Input Settings** is set to **Manual Selection**, and the **Frame/Field Rate** is set to **59.94 (NTSC)**.
- In the Video Configuration section of the Basic tab, the **Video Input Settings** is set to **Auto Detected**.

The appearance of this control is also a function of the Video Input Settings, Input Resolution and Input Source parameters.

The Closed Captioning controls are as follows:

- **Enable CC** — Select this box to enable Closed-Captioning insertion. Closed Captions are inserted in the video elementary stream, as per ATSC A/72. Both CEA-608 and CEA-708 captions are supported.
- **CC Source** — This controls where the encoder extracts closed captions from. This field may or may not be editable, depending on the video input settings, input resolution, and input source. The options are:
  - › CEA-608 Line 21 — This option can only be used for SD inputs. The encoder will extract all the CEA-608 information from both fields of Line 21, if present.
  - › SMPTE-334 VANC — This option can only be used for SDI inputs. The encoder will expect closed-captioning information in the VANC. Both CEA-608 and CEA-708 modes are supported (and automatically detected).

Note — *If the **Video Input Settings** is set to **Auto Detected**, the encoder will comply with the CC Source if possible, but may fall back to another setting depending on the input signal. For example, if CC Source is set to CEA-608 Line 21 and the encoder detects an HD signal, it will fall back to SMPTE-334 VANC. Conversely, if it is set to SMPTE-334 VANC and it detects a composite signal, it will fall back to CEA-608 Line 21 if that composite signal is NTSC, or turn off CC if that composite signal is PAL.*

Active Format Description

The encoder can extract Active Format Description (AFD) information from the incoming video signal and insert it in the compressed bit stream. AFD information can be extracted from the following sources:

- For SDI signals, AFD information can be present in the VANC as per ***SMPTE-2016-3***. This is the primary way of conveying AFD information on a professional video feed.
- For SD signals (either from Composite or SD-SDI sources), AFD information can be synthesized from Wide Screen Signaling (WSS) data present in the VBI (line 20 for NTSC signals, line 23 for PAL signals).
- The encoder also has the option of inserting a user-defined AFD code (instead of receiving it from the video input).

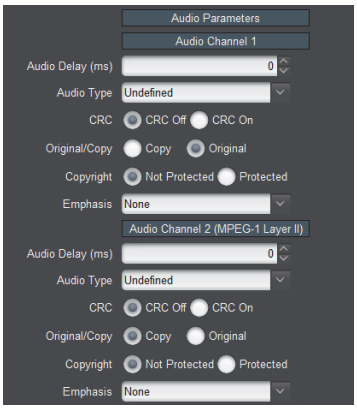
The AFD controls are as follows:

- **Enable AFD** — Check this box to enable AFD extraction and insertion. This control is always available. AFD is inserted in the video elementary stream as per ***ATSC A/72*** and ***ETSI TS 101 154***.
- **AFD Source** — This controls where the AFD information is coming from. Choose one of the following:
  - › Line 20/Line 23 WSS — This option causes the encoder to synthesize AFD information from WSS. It is available only if the input resolution is SD or if the video input settings are auto-detected. It will be displayed as Line 20 for NTSC and Line 23 for PAL. For PAL inputs, the conversion follows ***ETSI TS 101 154 Appendix B.4***.
  - › SMPTE-2016-3 VANC — This option causes the encoder to extract AFD from the VANC. It is only available for SDI inputs or if the video input settings are auto-detected.
  - › Manual AFD Selection — This option allows the user to specify a fixed AFD code to be inserted. Any AFD information received from the input is ignored. This can be used to override the original AFD information, or when the video is being scaled (e.g., when the input is HD and is being converted to SD).
- **AFD Code** — This control is displayed only when AFD Source is set to Manual AFD Selection. It corresponds to the codes listed in ***SMPTE-2016***.

Note — *If the **Video Input Settings** is set to **Auto Detected**, the encoder will comply with the CC Source if possible, but may fall back to another setting depending on the input signal. For example, if AFD Source is set to Line 20/23 WSS and the encoder detects an HD signal, it will fall back to SMPTE-2016-3 VANC. Conversely, if it is set to SMPTE-2016-E VANC and it detects a composite signal, it will fall back to Line 20/233 WSS (and automatically use the correct line number based on the input signal). However, **Manual AFD Selection** is always honored.*

Audio Parameters

The Audio Parameters are divided into three subgroups, some of which vary (and may not be present) according to the selections made in the Encoder Basic Configuration tab. A sample of the Audio Parameters section is depicted below.



Encoder 1 Tab — Advanced Tab, Audio Parameters

Analog Audio Parameters

These parameters are only displayed if the Audio Source in the Basic tab - Audio Configuration is set to Analog Audio.

Choose one of the following:

- **Audio Gain L (dB), Audio Gain R (dB)** — These controls allow an independent gain adjustment for the left/right audio channels, from -18.0 dB to +18.0 dB, in steps of 0.5 dB.
- **Audio Mute L, Audio Mute R** — These controls allow muting of the left/right audio channels.

A/V Sync Adjustment

This parameter can be used to provide a small amount of A/V sync adjustment, for cases where the A/V sync in the input signal to the encoder is not correct. If, in the input signal, audio is behind the video, you can use this parameter to compensate for up to 100 milliseconds. Note that it is only available for MPEG-1 Layer II and AAC-LC encoding; it will not be displayed for Dolby® Pass-through.

Use the **Audio Delay (ms)** field to compensate for up to 100 milliseconds of audio delay in the input signal. This setting will advance the audio in relation to the video by the amount configured.

PMT Information

The PMT Information section has the following parameters:

- **Audio Type** — determines the audio type in the PMT audio descriptor. This setting has no actual impact on how the audio is encoded; it only affects its description in the PMT. Choose one of the following:
  - › Undefined — no further information. This is the most common setting.
  - › Clean Effects — indicates that the audio has no language.
  - › Hearing Impaired — indicates that the audio is prepared for the hearing impaired.
  - › Visual Impaired Commentary — indicates that the audio is prepared for the visually impaired viewer.

If the Audio Encoding setting in the Basic tab - Audio Configuration is set to Dolby® Pass-through, another parameter becomes available in the PMT Information section.

The Dolby® PMT Type parameter controls how Dolby AC-3 audio is signaled in the PMT. Choose one of the following:

- **DVB** — Dolby® Audio is signaled as per ***ETSI TS 101 154 Appendix C*** (stream_type 0x06 with the AC-3 Descriptor from ***EN 300 468 annex D***).
- **ATSC** — Dolby® Audio is signaled as per ***ATSC A/53 Part 3*** (stream_type 0x81). This option is not implemented.

If the Output Protocol in the Encoder Connections tab is set to RTMP, the PMT Information fields will not be displayed as RTMP does not use the Transport Stream container.

Audio Encoder Specific Configuration

The appearance of this control depends on the Audio Encoding setting in the Basic tab - Audio Configuration.

Choose one of the following:

- **CRC** — Enables/Disables CRC insertion in the audio elementary stream. This is normally left disabled (CRC off).
- **Original/Copy** — Controls the state of the Original/Copy flag in the audio elementary stream. This setting does not affect the actual audio encoding.
- **Copyright** — Controls the state of the Copyright flag in the audio elementary stream. This setting does not affect the actual audio encoding.

- **Emphasis** — Controls the state of the Emphasis flags in the audio elementary stream. This setting does not affect the actual audio encoding. The available values are None, 50/15 us, and ITU-T J.17.

Additional Audio Channels

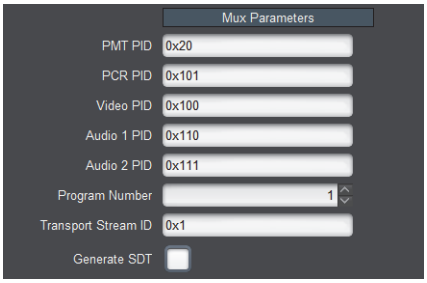
When Secondary Audio is set to Enabled, or Additional Audio Channels are enabled, the following changes take place:

- Additional sets of controls are displayed in the Encoder Advanced tab, corresponding to each of the enabled audio channels. Each set operates independently as described in the previous section.
- If Secondary Audio is set to Enabled, no Advanced Audio controls are displayed in the Advanced tab for Encoder 2.

Multiplexer Parameters

These parameters control the details of the audio/video multiplexing, and the (P)SI tables. If the Output Protocol in the Encoder Connections tab is set to RTMP, these parameters will not be shown as RTMP does not use the Transport Stream container.

The following MUX Parameters are always available if the Output Protocol is not set to RTMP.



Encoder 1 — Advanced Tab, MUX Parameters

PMT PID, PCR PID, Video PID, Audio PID

These parameters control the Packet Identifier (PID) values for the PMT, PCR, Video and Audio. The values can be entered in hexadecimal (prefixed by 0x) or in decimal. Valid values are from 0x20 (32) to 0x1FFE (8190). PMT PID, Video PID and Audio PID must be distinct values. PCR PID can either be the same as the video PID or distinct from the other values as well. The user interface will not accept an invalid entry at any time - it will immediately revert to the previous value. If additional audio channels are enabled, there will be additional entries for their corresponding PIDs.

Program Number

Enter the desired program number for this encoder channel. Valid program numbers go from 1 to 65535 and are always entered in decimal.

Transport Stream ID

Enter the desired Transport Stream ID for this encoder channel. Values in this field can be entered both in hexadecimal (prefixed by 0x) or in decimal.

Generate SDT

This box is always shown but is not selectable for the HTTP Live Streaming and RTMP protocols. If this box is checked, an SDT will be generated for this encoder channel. Additional SDT parameters become available once this box is checked

Service Name

Enter the desired SDT service name for this encoder channel. The default name is Slot **x** Encoder **y**, where **x** is the openGear® slot number where the encoder is installed, and **y** is 1 or 2 (for Encoder 1 or Encoder 2).

Provider Name

Enter the desired SDT service provider name. The default is Ross Video.

Advanced SDT Config

By default, the other SDT values are automatically set by the system. If you need to configure them, check this box, and a new set of parameters appears.

Running Status

Indicates the status of the service. The options are undefined, not running, starting, pausing, running, and service off-air. The value used for this parameter when Advanced SDT Config is not enabled is running.

Service Type

Indicates the type of service. The value used for this parameter when Advanced SDT Config is not enabled is advanced Codec SD digital television service if the encoder is in SD mode, or advanced Codec HD digital television service if the encoder is in HD mode. The drop-down list offers a few of the most common choices. If you need to code something other than these choices, select custom setting in the drop-down list and a new parameter will become available.

Custom Service Type

Enter the service type. This field accepts both hexadecimal (prefixed by 0x) and decimal values. The valid range is from 0 (0x00) to 255 (0xFF).

Original Network ID

This field contains the Network ID code from which this program originated. This field accepts both hexadecimal (prefixed by 0x) and decimal values. Valid values are from 0 (0x0000) to 65535 (0xFFFF). The default value for this field is 0xFF01, which is in the range of values allocated for video over IP.

EIT Schedule Flag

Check this box to set the flag. This flag indicates that EIT schedule information is present for this service. Since the encoder does not generate EITs, the correct setting of this flag is not set. Only set it if you intend to mux an EIT downstream of the encoder.

EIT P/F Flag

Check this box to set the EIT present/following flag for this service. Since the encoder does not generate EITs, the correct setting of this flag is not set. Only set it if you intend to multiplex an EIT downstream of the encoder.

Free CA Mode

Check this box to set the Free CA Mode flag. If this flag is set, it indicates that one or more components of the service are scrambled. Since the encoder does not offer scrambling, the correct setting of this flag is not set. Only set it if you intend to scramble the program downstream from the encoder.

Using the Encoder Connections Tab

The **Connections** tab is used to create output connections for the encoder. The set of output options offered is a function of whether or not Secondary Audio and/or Additional Audio are enabled. Once an option is selected, the appropriate configuration parameters are displayed. Choose one of the following:

- **ASI/IP Streaming** — the output of the encoder is available for connection to ASI Outputs and IP Outputs, as described later in this manual.
- **HTTP Live Streaming** — the output of the encoder is directed to a web server (which can be the internal server in the encoder or an external server), which in turn serves it to web clients using HTTP Live Streaming. If this option is selected, the encoder output is not available to ASI and IP Output ports, and the video bit rate is limited to 15Mbps. Moreover, the GOP Mode parameter in the Advanced tab - Video Parameters will be forced to Closed GOP. This output option is not available if Secondary Audio is enabled.
- **Direct HTTP Streaming** — the output of the encoder is available to clients over a standard HTTP connection. Clients will open an HTTP connection to the encoder, send a standard HTTP GET request, and receive the bit stream (for as long as they keep the connection open). This output option is not available if Secondary Audio is enabled.
- **RTMP** — the encoder will operate as an RTMP client, connect to a specified RTMP server and publish the stream, similar to the Adobe® Flash® Live Media Encoder (FMLE). This output option is not available if Secondary Audio is enabled. If this is selected, the GOP Mode parameter in the Advanced tab - Video Parameters will be forced to Closed GOP.

ASI/IP Streaming

If this option is selected, the standard Output Selection Connection Parameters are presented. These connection parameters are common to all data sources, and are described in the section "**Destination Selection**" on page 8-2.

HTTP Live Streaming

HTTP Live Streaming is a protocol designed to deliver live streaming content to clients on the Internet using a standard unmodified Web Server, and the standard HTTP protocol. (**Figure 5.1**)

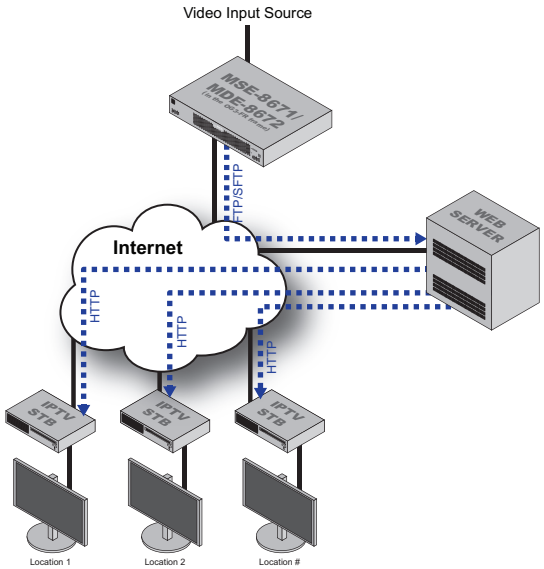


Figure 5.1 *Example of a Possible HTTP Live Streaming Setup*

The highlights of the protocol are:

- The encoder segments the bit stream into small files of similar duration, at some suitable points.
- The encoder continuously uploads the files as they are created to a standard web server.
- Every time the encoder uploads a new file, it also updates a special play-list file in the server, which informs the clients of which segments are available.
- The encoder also takes care of deleting old files from the server.
- The clients can connect to the web server at will; they download the play-list file, and start playing the segments as they come.
- A standard unmodified web server can be used.

HTTP Live Streaming is supported in the encoder[1]. The content can be uploaded to an external server, or served directly from the unit.

Uploading to an External Server

When uploading to an external server, the configurable parameters are as follows.

Server Location

Choose from the following:

- **Remote** — the segments are uploaded to a remote web server, using FTP or SFTP.
- **Local** — uses the local server in the device itself.

Transfer Protocol

This configures the protocol to be used between the encoder and the web server for uploading the files. The two options are FTP and SFTP (Secure FTP). FTP exchanges data and password in the clear, while SFTP encrypts both flows.

Server Address

Enter the IP address of the web server here. It needs to be reachable from either one of the encoder's Ethernet ports.

Username

Enter the username to be used when uploading the files to the server.

Password

Enter the password corresponding to the user name, to be used when uploading the files.

Server Path

Enter the absolute server path for the directory where the files should be placed. It is recommended that a separate directory be created for each encoder.

Base File Name

Enter the base file name for the files created in the server. The encoder will create the following files:

1. A license is required for this feature. Contact Ross Video Technical Support for details.

- **basename.m3u8** — This is the top play-list file. For the example above, where the base file name is `live`, the play-list file will be `live.m3u8`. This file will contain a single bit rate profile. It is created when the encoder starts, and not changed during operation. For backward compatibility with previous versions, a top play-list with an "`.m3u`"extension and identical contents will also be created.
- **basename_p.m3u8** — This is the current play-list file for the encoder profile. It is updated every time a new segment is created.
- **basename_XXXX.ts** — These will be the bit stream encoded files where **XXXX** is an increasing count. For example, the encoder will create files named `live_1.ts`, `live_2.ts`, `live_3.ts`, `live_4.ts`, and so on. At any given point in time, there will be five or six consecutive files in the configured directory if the encoder is configured to remove older files.

Segment (sec)

Number of seconds per segment. This defines the approximate size (in seconds) for the above bit stream encoded files. The valid range is from 1 to 20 seconds. Note that the clients will experience latency approximately equal to the segment size times the number of segments. The recommended value is 10 seconds. Setting the segment size to less than 3 seconds may cause performance issues with the FTP/SFTP server (especially Microsoft® Windows® servers running FileZilla); the result will be a non-zero count of dropped segments.

Number of Segments

This defines the number of bit stream segments advertised in the play-list. The minimum number, as per the HLS specification, is 3. Some set-top boxes require 4 segments. Apple® devices work well with three segments.

Extra Server Compatibility

Check this box if the encoder has problems renaming files in the server. This is typically required for Microsoft® Windows® FTP servers. Linux® based servers do not need this. Ross Video recommends checking this box only if your server requires it.

Keep Segments on Server

Normally, when a segment falls out of the play-list file, it is automatically deleted by the encoder. If you check this box, the bit stream is left in the server. Clients will still start playing from the first segment in the play-list.

Program Name

This program name is placed in the play-list file. Whether or not it is shown depends on the client. This is an optional parameter.

For example,

If the directory `/var/www/TV` is published on server `www.example.com` as `http://www.example.com/TV`, the URL for the video will be:
`http://www.example.com/TV/live.m3u8`

Using the Built-in Server in the Encoder

When using the built-in server of the encoder, the options are:

Server Location

Select Local to use the local server in the device itself.

Segment (sec)

Number of seconds per segment. This defines the approximate size (in seconds) for the above bit stream encoded files. The valid range is from 1 to 20 seconds. Note that the clients will experience latency approximately equal to the segment size times the number of segments. Given the limited amount of memory storage in the local encoder server, at higher bit rates the segment size will be limited. The encoder has 20Mbytes of storage per encoder.

Number of Segments

This defines the number of bit stream segments advertised in the play-list. The minimum number, as per the HLS specification, is 3. Some set-top boxes require 4 segments. Apple® devices work well with 3 segments.

Program Name

This program name is placed in the play-list file. Whether or not it is shown depends on the client. This is an optional parameter. If entered, it will be shown as part of the encoder link in the web page generated by the encoder.

In local server mode, the access URLs for the content are:

`http://xxx.xxx.xxx.xxx/HLS/encoder1.m3u8`

`http://xxx.xxx.xxx.xxx/HLS/encoder2.m3u8`

where `xxx.xxx.xxx.xxx` is the IP Address of the encoder Ethernet port. In the encoder openGear® version, HLS streams are available through both streaming Ethernet ports. Note that if you use a browser to go to the encoder IP address (i.e., just go to http://xxx.xxx.xxx.xxx), there will be a link for the HLS page.

HLS Implementation Notes

Keep the following in mind when implementing HLS:

- When HTTP Live Streaming is selected, the GOP Mode control is set to Closed GOP and is not selectable. This is done to ensure that each segment is self-contained.
- The maximum video bit rate allowed in HLS mode is 15Mbps.
- The maximum aggregate performance of the built-in HLS server in the encoder is between 20 and 30Mbps (total bit rate to all clients), and is somewhat dependent on network conditions. The built-in server is intended to serve only a small handful of clients and performance is not guaranteed at the capacity limits; if you need to scale, please use a remote server.
- If you are streaming to Apple® devices such as an iPhone®, iPad® or iPod®, you must also select the following:
  - **Audio Encoding** — Select AAC-LC.
  - **Output Resolution** — If you are streaming to older Apple devices, select one of the resolutions ending in /15p (e.g., 320x240/15p). If your input is PAL, these resolutions will be shown ending in /12.5p. Newer devices may be able to support higher resolutions.

Direct HTTP Streaming

Direct HTTP Streaming is an output mode whereby clients open a standard HTTP connection to the encoder and issue a standard HTTP GET request. The encoder will send the appropriate HTTP response followed by the encoder bit stream; the bit stream will be transmitted for as long as the client maintains the connection. Since HTTP runs on top of the TCP protocol, it is possible for the encoder to deliver content over the Internet using this mode. However, it has the following limitations:

- The encoder has to send one independent copy of the bit stream to each client. There is a limit of 5 clients or 20Mbps per Ethernet port in this mode.
- The TCP protocol is capable of flow control; if the client is not fast enough, or if the network between the encoder and the client is not fast enough, the protocol will attempt to throttle the encoder, which is not possible. The encoder will buffer a small amount of bit stream in this case, but if the overall performance of the client/network link combination is insufficient to support the configured encoder data rate, the encoder will drop transport packets.

Direct HTTP Streaming has one parameter: Listening Port.

Listening Port

Use this to select the TCP port to be used by the encoder to listen to HTTP connections. Note that the encoder will not accept the values 22, 23, 80, 1935 and 5253 for this parameter as these ports may be internally used by the encoder. The listening ports for Encoders 1 and 2 can be set independently (and can be set to the same value if desired).

The URL for accessing the bit stream will be:

`http://encoder_ip:port/encoder1 (access to encoder1)`

or

`http://encoder_ip:port/encoder2 (access to encoder2)`

Where encoder_ip is the IP address of either one of the encoder Ethernet ports (configured in the Network tab) and port is the Listening Port configured above. For example, if one of the IP addresses of the encoder is set to 10.10.9.80, and the Listening Port is set to 8000 (as shown above), the URL for Encoder 1 will be: `http://10.10.9.80:8000/encoder1`

Please note that none of the common web browsers (Windows® Explorer®, Mozilla® Firefox®, etc.) are capable of directly playing this URL; what these browsers will do is download the bit stream to a file. If you wish to see video playback on a web page, refer to the chapter "**Playing Video on a Web Page**" on page 10-1.

Real Time Messaging Protocol

The encoder can operate as an Real Time Messaging Protocol (RTMP) client, and publish a real-time, live bit stream to an RTMP server. RTMP clients (such as the Adobe® Flash® Player) can connect to the server and play the live stream. The encoder can generally connect to the same servers as the Adobe® Flash® Media Live Encoder (FMLE).

An RTMP server publishing point is defined by the following:

- An RTMP URL, of the form: `rtmp[t][e][s]://servername/app`
- A stream name

The first part of the URL defines the protocol, as follows:

- rtmp — standard RTMP with no security
- rtmpt — RTMP tunneled over HTTP
- rtmpe — encrypted RTMP using proprietary security
- rtmps — encrypted RTMP over SSL
- rtmpte — encrypted RTMP using proprietary security, tunneled over HTTP
- rtmpts — encrypted RTMP over SSL, tunneled over HTTP

The **server-name** field is the host name or IP address of the RTMP server to be contacted. The **app** field is the application in the server that should receive the data being transmitted. Note that, depending on the service, the **app** field may contain a complete path or even a set of parameters.

The RTMP configurable parameters are outlined below.

RTMP Protocol

Select the protocol variant, as discussed above.

Primary Server

Enter the host name or IP address of the primary (or single) RTMP server to be contacted. If you want to use host names instead of IP addresses, make sure to configure at least one DNS server. DNS servers may be configured in the DNS sub-tab of the Network Configuration tab as outlined in the section "**DNS Tab**" on page 4-4.

Primary Network Interface

Select the network interface to be used when contacting the primary server. Choose from the following:

- **Any** — Use the optimal network interface to connect to the server.
- **Ethernet 1** — Specifies to use Ethernet 1 to connect to the server. If the server is not in the same subnet as Ethernet 1, and no default gateway is set for Ethernet 1, this setting will be ignored.
- **Ethernet 2** — Specifies to use Ethernet 2 to connect to the server. If the server is not in the same subnet as Ethernet 2, and no default gateway is set for Ethernet 2, this setting will be ignored.

Primary App

Enter the application name in the primary server, as discussed above. Consult your CDN or server documentation for details on what should be entered in this field.

Primary Server URL

This read-only field is automatically updated as you configure the RTMP parameters. It displays the full RTMP URL for the primary server.

Primary Stream

Enter the stream name for the primary server. Consult your server documentation or CDN for details on what should be entered here. Some servers allow arbitrary stream names, while others use this field for authentication and thus require specific names.

Backup Server

If you have a backup RTMP server, configure it here; otherwise, this field can be left empty. The encoder will only attempt to contact the backup RTMP server if it cannot establish a connection with the primary server.

Backup Network Interface

Select the network interface to be used when contacting the backup server. The meaning of the choices is the same as the outlined in the section "**Primary Network Interface**" on page 5-28.

Backup App

Enter the application name in the backup server. If this field is left blank, the value entered for Primary App is used.

Backup Server URL

This read-only field is automatically updated as you configure the RTMP parameters. It displays the full RTMP URL for the backup server.

Backup Stream

Enter the stream name for the backup server. If this field is left blank, the value entered for Primary Stream is used.

Redundancy Switch Time (sec)

This field is only displayed if a Backup Server is specified (i.e. it will not be present if the Backup Server field is left blank). It sets the timeout for encoder to switch servers after the RTMP connection is established, if the server stops accepting data, such as when the IP Output Rate goes to 0 (zero).

Port Selection

If your RTMP server is using the default TCP ports for the protocol variant, select Use Default. If your server is using a non-standard port, select Specific Port. When Specific Port is selected, an additional field is displayed:

Port

This field is only displayed if Port Selection is set to Specific Port. Configure a non-standard TCP port here.

Authentication

Some RTMP servers require username/password authentication for access. If your server does not require authentication, select **No**, otherwise select **Yes**.

If you select **Yes**, additional fields are displayed:

- **Username** — Enter the username to be used for authentication.
- **Password** — Enter the password to be used for authentication.
- **App** — Enter the application name in the server, as discussed above. Consult your CDN or server documentation to find out what should be entered in this field.
- **Server URL** — This field is automatically updated as you configure the RTMP parameters. It displays the full RTMP URL for the primary server. The backup server URL is similar.
- **Stream** — Enter the stream name. Consult your server documentation or CDN to find out what should be entered here. Some servers allow arbitrary stream names, while others use this field for authentication and thus require specific names.
- **Connect** — This parameter controls whether or not the encoder should actually establish a connection with the server. If you set this parameter to No, the encoder will run but no data will be transmitted. This is useful to pre-configure a session, and turn it on later when it comes the time to broadcast.

Notes

Keeping the following in mind when using RTMP:

- The maximum aggregate RTMP performance for the encoder is 12Mbps. If the unit has two encoder channels, this limit applies to the sum of their video bit rates. For example, if one encoder channel is configured for RTMP at 8Mbps, the other can only be configured for RTMP at 4Mbps or less. The limit does not apply to encoder channels configured for UDP/RTP/ASI streaming.
- Using one of the encrypted variants of the protocol (rtmpe, rtmps, rtmpte, or rtmpts) will also have a performance impact and will reduce the maximum usable rate.
- Performing a firmware update while the encoder is running RTMP at high bit rates may cause service interruptions to the RTMP stream. If you need to update the firmware, we recommend that you do so during a maintenance window.
- Some CDNs only accept frame rates up to 30fps and required Closed GOP operation. Refer to the section "**Using the Advanced Configuration Tab**" on page 5-15 for details.
- In RTMP Mode, the encoder will force Closed GOP operation as required by some CDNs. Refer to the section "**Using the Advanced Configuration Tab**" on page 5-15 for details

ASI Outputs Tab

In This Chapter

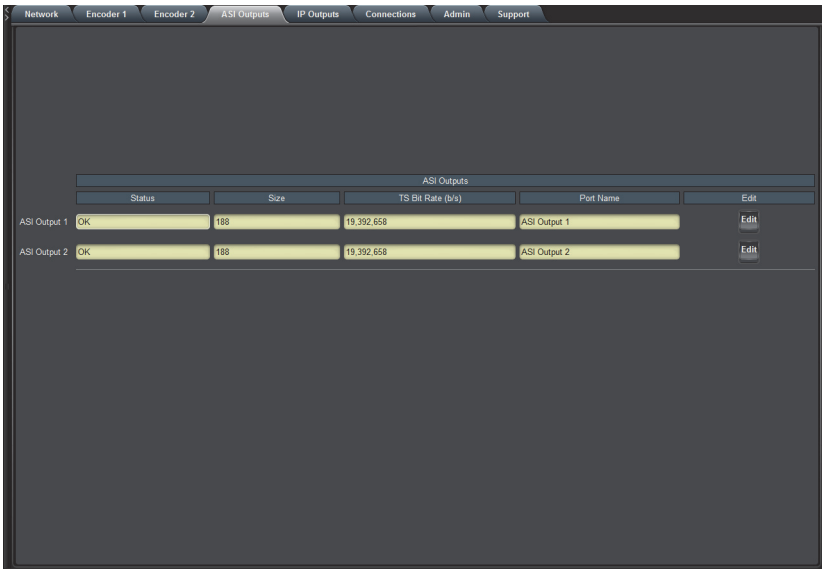
The encoder has two ASI output ports that can be independently configured using the ASI Outputs tab in DashBoard. This chapter discusses the functions and options in the ASI Outputs tab.

The following topics are discussed:

- ASI Outputs Configuration Tab
- ASI Outputs Configuration

ASI Outputs Configuration Tab

This section provides a general overview of the ASI Outputs tab.



ASI Outputs Tab

Status

This field displays one of the following messages:

- **OK** — Port is operating correctly.
- **Unlocked** — Port is unlocked and is operating in Automatic Bit Rate mode. There is no input.
- **Overflow** — Transmit overflow. The ASI Output is in Manual mode, and the configured bit rate is insufficient to carry the bit streams connected to it. This situation will raise an alarm as packets are being dropped.

Size

This field indicates the configured transport packet size, in bytes.

TS Bit Rate

This field reports the actual transport stream bit rate, in bits/second.

Port Name

This field reports the user-configured name assigned to the port

Edit Button

Clicking this button enables configuration of the port. The ASI Output Configuration tab displays, with the settings for the selected port.

ASI Outputs Configuration

To configure an individual port, click the **Edit** button for that port in the ASI Outputs area. The Configuration tab can be divided into two parts: ASI Output Parameters, and Input Selection Connection Parameters.

The Connection Parameters are common to all outputs, and are further described in the chapter "**Connections Tab**" on page 8-1.

Port Name

All encoder encoders and outputs can be assigned a user-defined Port Name. This name is used to identify the port later when making connections. Use any descriptive name suitable for your application, or accept the default.

Packet Size

Select between 188 and 204bytes.

ASI Rate

The following two modes are available:

- **Manual** — In this mode, the ASI output bit rate is set to the value entered in the Bit Rate field. The ASI output will maintain this rate at all times, as follows:
  - › If there is no connection to the ASI port, or if the input connected to the ASI port is not active, the ASI port will transmit NULL packets.
  - › If the connected input bit rate is lower than the rate entered in the Bit Rate field, the ASI port will add NULL packets as required to pad it to the desired value. PCR packets will be re-stamped as required.
  - › If the connected input bit rate is higher than the rate entered in the Bit Rate field, the ASI port will attempt to remove NULL packets from the connected bit stream in order to achieve the desired value. PCR packets will be re stamped as required. If there are not enough NULL packets to be deleted, packets will be dropped, and an alarm will be raised. This alarm will be indicated in the DashBoard Card State field, in the front Status LED, and in the ASI status tab.
- **Automatic** — If this mode is selected, the Bit Rate field disappears. The ASI output will exactly match the rate of the connected bit streams. However, if the connected ports have no data, or if there is no connection to the ASI port, there will be no output, and any connected downstream ASI device will indicate loss of sync. The ASI status tab will indicate this state, as well as the rear I/O panel indicator LED. Note that an alarm will only be raised if there is at least one connection to the ASI output.

Bit Rate

This field is only available if the **ASI Rate** mode is set to **Manual**.

Enter the desired ASI output bit rate here, in bits/second. The minimum value is 64,000 and the maximum value is 213,000,000.

Apply

Once the port is configured, click the **Apply** button, and the configuration takes effect.

IP Outputs Tab

In This Chapter

IP Outputs receive data from connected encoders or the test packet generators, format this data for transmission over UDP/IP, and send it with very precise timing over the Ethernet ports. Each card supports up to 4 transport stream outputs per Ethernet port.

The following topics are discussed:

- Getting Started
- Configuration Overview
- IP Output Parameters — Basic View
- IP Output Parameters — Advanced View
- SMPTE 2022 FEC Support
- Active IP Outputs Table
- Managing Unicast MAC Addresses

The IP Outputs have the following specifications:

Formats Supported

- MPEG-2 Transport Packets over UDP/IP
- MPEG-2 Transport Packets over RTP/UDP/IP

MPEG-2 Packets

The number of MPEG-2 Transport Packets per UDP datagram is fixed at 7.

Addressing Support

- unicast
- multicast
- broadcast

Control over IP Header Fields

Advanced control over the IP header fields available.

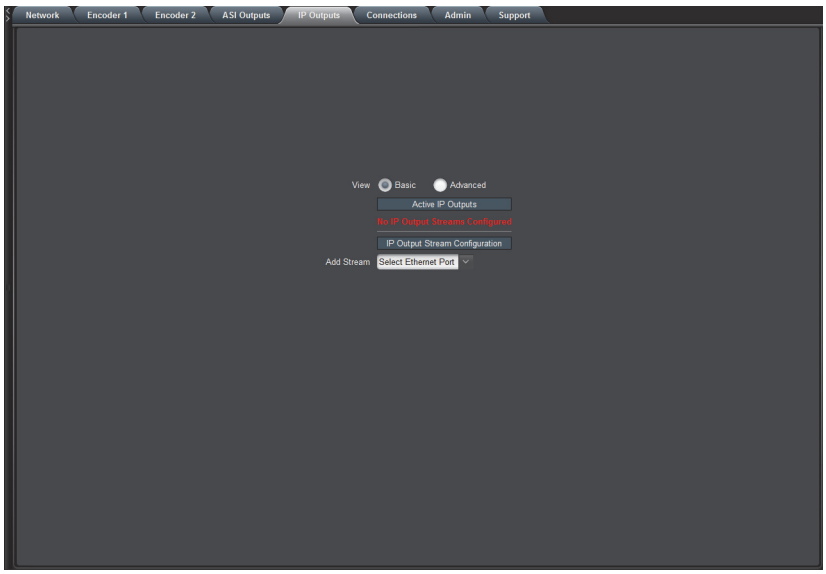
SMPTE 2022 FEC Support

Each card supports one FEC[1] session per Ethernet port.

1. Previously known as Pro-MPEG FEC COP3.

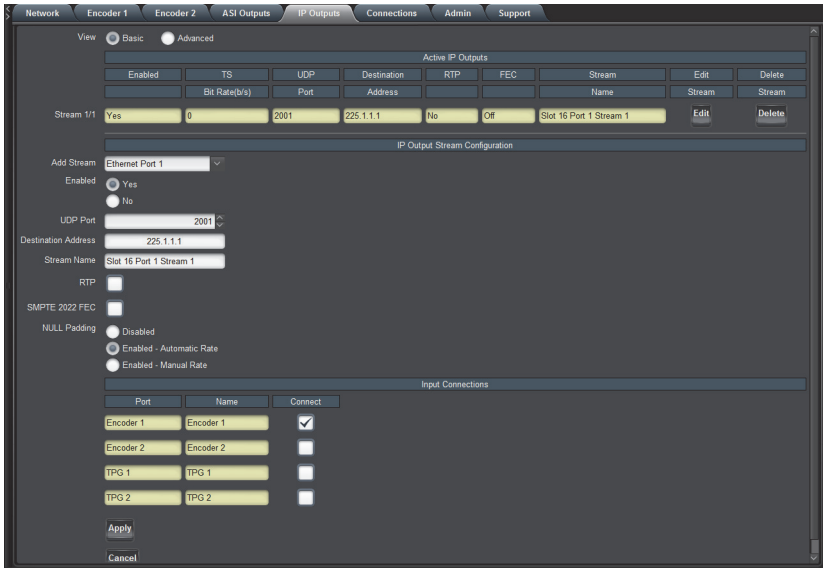
Configuration Overview

An IP output stream can be created, configured, and removed using this configuration area. Before any streams are created, the IP Outputs tab appears as depicted below:



IP Outputs Tab — No IP Output Stream Configured

To create an IP Output stream, first select the desired Ethernet port in the Add Stream drop-down box. Once that selection is made, the IP Output Stream Configuration is displayed, as depicted below.



IP Outputs Tab — IP Output Stream Options

The tab has two areas: IP Output Stream Configuration, and Input Connection parameters.

IP Output Parameters

These are the parameters specific to the IP Output configuration. The set of parameters available for configuration depends on the View selection. When **View** is set to **Basic**, the suitable default values are entered for the advanced parameters.

Input Selection Connection Parameters

These allow a connection to be made to the output stream. The Connection Parameters are common to all outputs, and will be described in the chapter "**Connections Tab**" on page 8-1.

IP Output Parameters — Basic View

When View is set to Basic, the Active IP Output parameters are available in addition to the IP Output Stream Configuration and Input Connection settings.

Active IP Outputs

The Active IP Outputs area of the tab is located near the top of the tab.

Enabled

This allows the output stream to be enabled or disabled. If it is disabled, no packet transmission takes place. This feature is provided for testing purposes (i.e., temporarily disable an output for fault-finding). Most users will leave the stream enabled.

UDP Port

Selects the UDP port to transmit to. Valid values are between 1 and 65535. Note that, in traditional IP networks, UDP ports between 1 and 1023 are reserved for administrative uses. Ross Video recommends the use of UDP ports 1024 and higher. The encoder, however, will accept any legal value. Note that if the port is configured for RTP (refer to the section "**IP Output Parameters — Advanced View**" on page 7-7), the UDP port must be an even number, and the encoder user interface will enforce this restriction - odd numbers will be automatically rounded up.

Destination Address

Selects the IP address to transmit to. Any unicast or multicast address can be entered here, with the exception of the loop back range (127.0.0.0 to 127.255.255.255). The encoder will also accept the broadcast IP address of 255.255.255.255, and will transmit the packets as Ethernet broadcasts. Use of broadcasts, however, is strongly discouraged.

Stream Name

All encoder input and output ports can be assigned a user-defined name. This name is used to identify the stream later when making connections. Use any descriptive name suitable for your application, or accept the default.

NULL Padding

This setting controls whether or not NULL packets are transmitted, making the stream completely CBR. IP networks are inherently VBR, and do not require NULL packets (which carry no information). However, the decoders may need them.

The following is a good set of rules for deciding whether or not to send NULL packets:

- If all your decoders are consumer IP set-top boxes or PCs running software decoders, NULL packets can be disabled.
- If your decoders include professional IRDs, NULL packets must be enabled. The great majority of professional IRDs will not work without them.
- If you are generating an MPTS (routing both encoders to the stream), enable NULL packets. An MPTS without NULL packets is technically illegal as per ISO/IEC 13818-1, but some systems support it.
- If you are not sure about what kind of decoder will be receiving the stream, enable NULL packets.

This control offers the following options:

- **Disabled** — NULL packets are disabled and will not be transmitted. This will cause the stream to be somewhat VBR, even if the encoder is set to CBR mode.
- **Enabled - Automatic Rate** — This setting enables NULL packets, but the bit rate is automatically set by the encoder to the minimum suitable value. This is the recommended setting. If you later reconfigure an encoder connected to this stream, the rate will be automatically adjusted.
- **Enabled - Manual Rate** — This setting allows you to specify the overall stream bit rate. If you specify the bit rate, it must be high enough to support the connected encoders (i.e., it must be at least equal to the sum of the encoder Transport Rate, found in each encoder Status tab). Specifying a rate that is not high enough will cause the IP Output to drop packets. Note that if this option is selected, the IP Output will be transmitting continuously at the selected bit rate, regardless of connections or the state of the encoders. If there is no connection to the IP Output, it will transmit only NULL packets; if there are connections and the encoders are stopped, it will transmit NULL packets plus (P)SI tables.

IP Output Parameters — Advanced View

If the Advanced View is selected, four more parameters are available for configuration.

TOS

This parameter allows the configuration of the Type-Of-Service (TOS) byte in the IP header (also known as the Differentiated Services - DS - field). Valid values are between 0 and 255. Configuring this is only useful if the downstream router is configured to honor the field.

TTL

This parameter allows the configuration of the Time-To-Live (TTL) byte in the IP header. Valid values are between 0 and 255. If not explicitly configured, it defaults to 128. This field controls how many hops the packet can traverse before it is dropped by a router. The default value of 128 is suitable for virtually all applications.

DF Bit

This parameter allows the configuration of the Do-not-Fragment (DF) bit in the IP header. The encoder will never produce fragmented packets, and with the UDP payload set to 7 transport packets, the IP packets are guaranteed to fit inside the Ethernet MTU. This control is provided for compatibility with legacy switches/routers. Some legacy equipment may exhibit performance problems if this bit is not set. This is not an issue with current network equipment.

RTP

If this box is checked, the card will include Real Time Protocol (RTP) headers in the output flow. If it is not checked, the transport stream will be sent over UDP/IP without any additional headers. Note that RTP requires the use of even UDP port numbers; when this box is checked, the user interface will enforce this restriction. The card will not generate RTCP packets.

If the RTP box is checked, an additional control to enable SMPTE 2022 FEC may be displayed if a FEC session is available for configuration. The card only supports one FEC session per Ethernet port; once FEC is enabled on a given stream, this option will not be offered for the other streams in the same port.

SMPTE 2022 FEC

Each card supports SMPTE 2022 FEC in one stream per Ethernet interface. If no streams are currently configured for SMPTE 2022 FEC, the **SMPTE 2022 FEC** check box is displayed. If it is not displayed, the another stream is already using the feature.

Select this box to enable transmission of SMPTE 2022 FEC packets for this stream. Note that SMPTE 2022 requires the use of RTP; checking this box will cause the RTP box to be checked as well. Refer to the section "**SMPTE 2022 FEC Support**" on page 7-9 for details on configuring support for FEC.

NULL Padding

This setting controls whether or not NULL packets are transmitted, making the stream completely CBR. IP networks are inherently VBR, and do not require NULL packets (which carry no information). However, the decoders may need them. The following is a good set of rules for deciding whether or not to send NULL packets:

- If all your decoders are consumer IP set-top boxes or PCs running software decoders, NULL packets can be disabled.

- If your decoders include professional IRDs, NULL packets must be enabled. The great majority of professional IRDs will not work without them.
- If you are generating an MPTS (routing both encoders to the stream), enable NULL packets. An MPTS without NULL packets is technically illegal as per ***ISO/IEC 13818-1***, but some systems support it.
- If you are not sure about what kind of decoder will be receiving the stream, enable NULL packets.

This control offers the following options:

- **Disabled** — NULL packets are disabled and will not be transmitted. This will cause the stream to be somewhat VBR, even if the encoder is set to CBR mode.
- **Enabled - Automatic Rate** — This setting enables NULL packets, but the bit rate is automatically set by the encoder to the minimum suitable value. This is the recommended setting. If you later reconfigure an encoder connected to this stream, the rate will be automatically adjusted.
- **Enabled - Manual Rate** — This setting allows you to specify the overall stream bit rate. If you specify the bit rate, it must be high enough to support the connected encoders (i.e., it must be at least equal to the sum of the encoder Transport Rate, found in each encoder Status tab). Specifying a rate that is not high enough will cause the IP Output to drop packets. Note that if this option is selected, the IP Output will be transmitting continuously at the selected bit rate, regardless of connections or the state of the encoders. If there is no connection to the IP Output, it will transmit only NULL packets; if there are connections and the encoders are stopped, it will transmit NULL packets plus (P)SI tables.

SMPTE 2022 FEC Support

The card supports one FEC session per Ethernet port. A check box for SMPTE 2022 FEC is displayed if the feature is available. Once this feature is enabled for one of the streams in a given Ethernet port, the check box will no longer be displayed.

Once the SMPTE 2022 FEC box is checked, additional parameters become available for configuration.

FEC Mode

If you select Column Only, the encoder will send a single FEC flow, corresponding to the column protection data, using a UDP port number corresponding to the media UDP port number plus 2.

If you select Row and Column, the encoder will send two FEC flows, the first corresponding to the column protection data, and the second corresponding to the row protection data.

The row protection data will be sent using a UDP port number corresponding to the media UDP port number plus 4. Note that not all receivers support Row and Column mode; such receivers will only use the FEC Column data and discard the FEC Row data.

Columns

Number of columns in the FEC matrix. This variable must be between 1 and 20 if FEC Mode is set to Column Only, and between 4 and 20 if it is set to Row and Column.

Rows

Number of rows in the FEC matrix. This variable must be between 4 and 20.

FEC Overhead

This field is updated as configuration is entered, and contains the overhead for the selected FEC configuration. Note that not all parameter changes cause the overhead to change. The FEC overhead is the sum of a Column overhead and a Row overhead (which is zero if FEC Mode is Column Only). The overhead is a function of the settings, as follows:

- Increasing the number of columns decreases the Row overhead (if enabled) and does not change the Column overhead.
- Increasing the number of rows does not change the Row overhead and decreases the Column overhead.
- Decreasing the number of rows and columns has the opposite effect as the previous items.

Constraints

The following constraints apply to the FEC function:

- The number of rows must be between 4 and 20.
- The number of columns must be between 1 and 20 for Column Only mode, or between 4 and 20 in Row and Column mode.
- The size of the FEC matrix (product of the number of rows and the number of columns) must not exceed 100.

The user interface will not allow invalid configurations to be entered, and will automatically make parameter adjustments as required. For example,

- If you select Row and Column, and the number of columns is less than 4, it will be automatically adjusted to 4.
- If your number of rows is 10, and you set the number of columns to 20, the number of rows will be automatically reduced to 5.

The number of rows and columns should be selected based on some understanding of the packet loss characteristics of the network between the encoder and the receivers. If you have no statistics on packet loss, the recommended setting is 20 columns and 5 rows to maximize the correction capabilities. Most receivers that support SMPTE 2022 FEC provide packet loss/recovery statistics. After running for a while, if the network is found to be clean, consider reducing the matrix to 10 rows and 10 columns, which will reduce the overhead.

Completing the Configuration

Once the configuration information is filled in, click on the **Apply** button to make it active. If there are no errors, the stream will be created, and the configuration area disappears. If any errors are detected, they will be displayed at the top of the **Apply** button.

The following configuration-related errors are flagged.

UDP Port/Address conflict with Port X/Y

You have configured two IP Output streams with the same destination IP Address and UDP port, on the same Ethernet interface. Please review your settings. Note that ports with FEC enabled will use either two or three UDP ports (depending on the FEC settings) - these are checked as well.

Maximum number of streams exceeded on this port

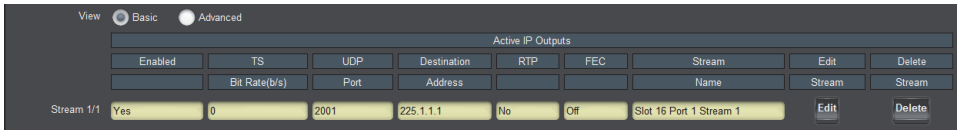
You will receive this message if you attempt to create more than 4 IP outputs on a given Ethernet port.

No SMPTE 2022 FEC License Available

The SMPTE 2022 function requires licensing. Please contact Ross Video to obtain a license.

Active IP Outputs Table

Once the output is created, it is added to the Active IP Outputs table, which has Basic and Advanced views. This table provides a summary of the configuration and status of the output stream. An example of this table, in the Basic view, is depicted below.



Example of an Active IP Outputs Table

Basic View

The Basic view includes the following fields:

Enabled

The configured value of this parameter.

TS Bit Rate

This column provides the current bit rate of the output transport stream. This does not include UDP and IP overhead, nor RTP/FEC overhead.

UDP Port

The configured value of this parameter.

Destination Address

The configured value of this parameter.

RTP

The configured value of this parameter.

FEC

Summary of the FEC configuration. If FEC is disabled, this field will indicate it as Off. If FEC is enabled, this field will indicate the FEC matrix size as Columns × Rows, and the protection mode as C for Column Only or R-C for Row and Column. In the example above, Stream 1/1 has Column Only FEC with 1 Column and 4 Rows, and Stream 2/1 has Row and Column FEC with 4 Columns and 10 Rows.

Stream Name

The configured stream name.

Edit Stream

If you click the **Edit** button, you can modify all the parameters for this output. The configuration area will re-open with the current output settings.

Delete Stream

If you click the **Delete** button, the stream is deleted and removed from the table.

Advanced View

When **View** is set to **Advanced**, additional fields appear in the table. The Advanced view includes all items in the Basic view plus the following.

Line Rate

This column replaces the TS Rate column in the Advanced view. It indicates the actual Ethernet line rate for the stream, including the MAC, IP, UDP, RTP and FEC overheads.

Null Padding

The configured value of this parameter (shown as No, Auto, or Manual).

TOS

This parameter allows the configuration of the Type-Of-Service (TOS) byte in the IP header (also known as the Differentiated Services – DS – field). Valid values are between 0 and 255. Configuring this is only useful if the downstream router is configured to honor the field.

TTL

This parameter allows the configuration of the Time-To-Live (TTL) byte in the IP header. Valid values are between 0 and 255. If not explicitly configured, it defaults to 128. This field controls how many hops the packet can traverse before it is dropped by a router. The default value of 128 is suitable for virtually all applications.

DF

This parameter allows the configuration of the Do-not-Fragment (DF) bit in the IP header. The encoder will never produce fragmented packets, and with the UDP payload set to 7 transport packets, the IP packets are guaranteed to fit inside the Ethernet MTU. This control is provided for compatibility with legacy switches/routers. Some legacy equipment may exhibit performance problems if this bit is not set. This is not an issue with current network equipment.

Destination MAC

The destination MAC address for this IP Output. For multicast destination addresses, this is derived from the destination IP address using the rules from RFC 1112. For unicast destination addresses, this is obtained using the ARP protocol. If this entry is the word Unknown, the encoder has failed to obtain a destination MAC address. The IP Output is not streaming. A more detailed description of the unicast MAC address algorithms used in the encoder is presented in the section “**Managing Unicast MAC Addresses**” on page 7-13.

Managing Unicast MAC Addresses

When the encoder is configured with a unicast destination address, it needs to obtain a corresponding MAC address (corresponding to either the final destination, if it is in the same subnet, or to the default gateway). These MAC addresses are obtained using the ARP protocol. The encoder uses a custom MAC address management algorithm, designed specifically for MPEG operation.

When an IP Output stream with a unicast destination address is created, the encoder immediately starts attempting to obtain a MAC address for it, using standard ARP requests. These requests are issued every two seconds until answered. No packets will be transmitted on that IP Output until a MAC address can be obtained. Note that this process will happen even if the stream is configured to be in the disabled state.

Once a MAC address is obtained, the encoder will cache it for about 5 minutes, as it is usual for IP devices. Unlike other IP devices, the encoder will keep on using the MAC address until a response is received, to avoid stream interruptions. If no response is received at that time, the encoder will raise a yellow alarm. This alarm can be seen in the IP Output status tab, described in the section "**IP Outputs Status Tab**" on page 11-12.

The current state of the encoder current streaming ARP cache is available in the Advanced View of the Active IP Outputs table, described in the section "**Active IP Outputs Table**" on page 7-11.

Connections Tab

In This Chapter

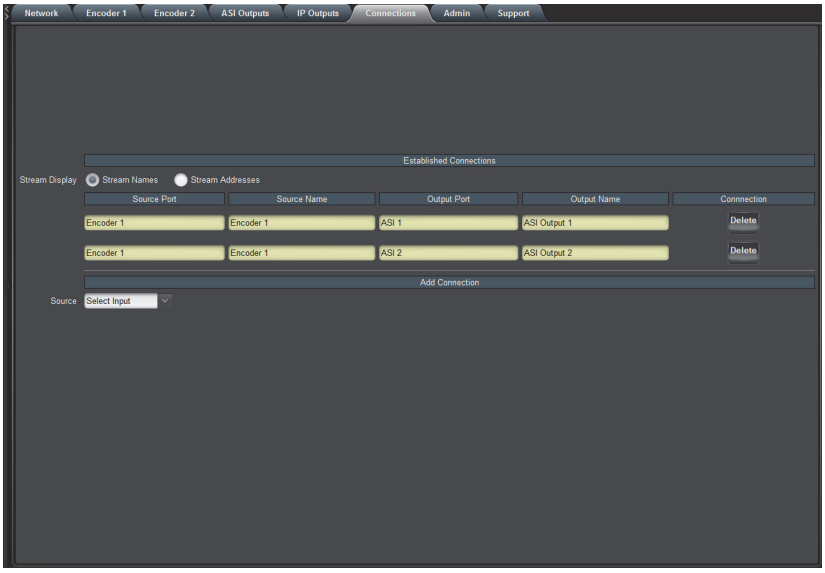
The Connections tab allows the creation, deletion, and management of input-output connections.

The following topics are discussed:

- Connections Configuration Tab
- MPTS Configuration Tab

Connections Configuration Tab

The Connections configuration tab is depicted below. The message "`No Connections`" displays if there are no configured input/output connections in the encoder. If the encoder has two encoder channels installed, there are two sub-tabs, to switch between the Connections configuration interface and the MPTS configuration/status interface.



Connections Tab — Single Channel

To establish a connection

1. Select a source and a destination.
2. Click **Apply**.

Source Selection

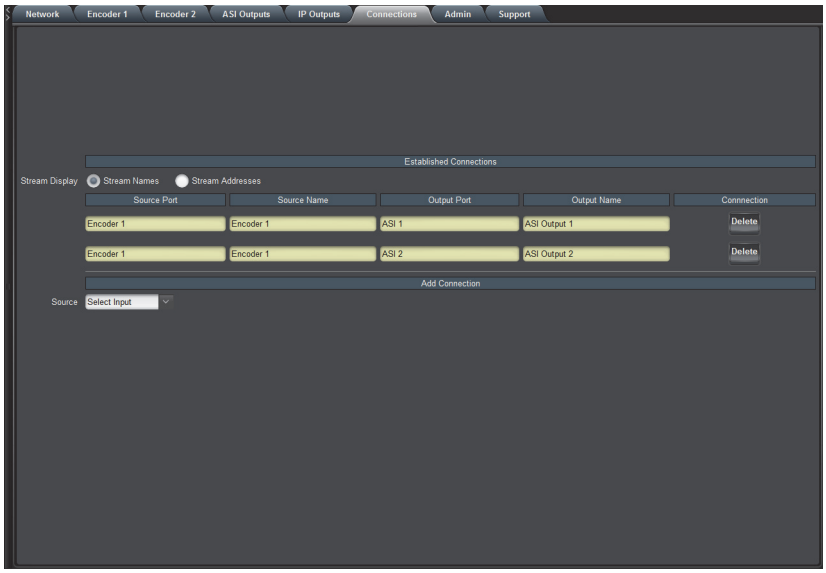
There are four sources in the encoder:

- Up to two Encoder channels as described in the chapter "**Encoder Setup**" on page 5-1)
- Two Test Packet Generators as described in the section "**Test Packet Generator Tab**" on page 9-9.

The connection process starts by selecting one of these data sources, using the Source drop-down menu. Once a source is selected, a list of available destinations is displayed.

Destination Selection

The list of available destinations always includes all the defined IP Output ports, as well as the two ASI ports. This interface is also available if you select ASI/IP Streaming in the Encoder Connections tab, and in the Admin Test Packet Generator tab. If **Stream Display** is set to **Stream Names**, the user-defined names are presented. This is displayed below.



Stream Display — Set to Stream Names

If you would prefer to make the output selection by Destination Address and UDP Port, set **Stream Display** to **Stream Addresses**.

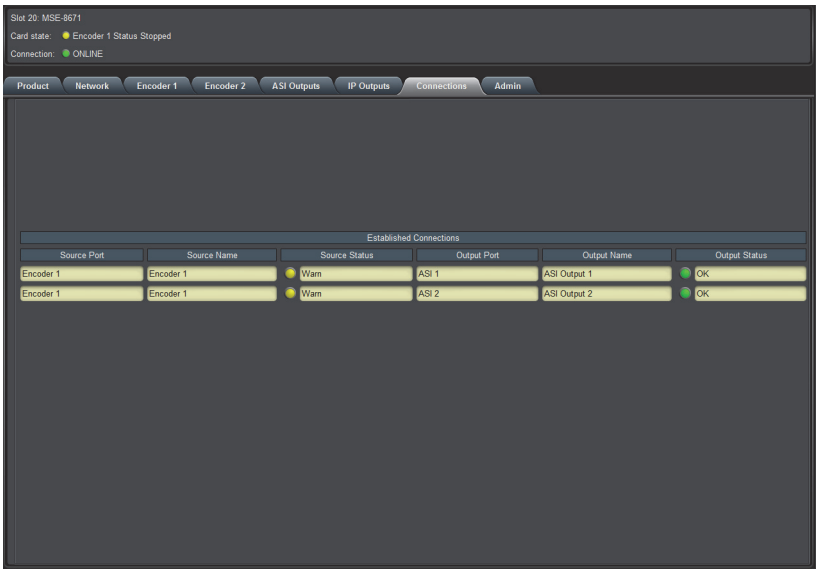
To make the connections, simply check the Connect box in front of the input you wish to use. You can connect any source to as many outputs as you wish. Conversely, clearing the box disconnects that particular source-destination pair.

Source Selection in the Output Ports

When configuring an output (ASI or IP), connections can be immediately made as well, in that output's configuration interface. The user-defined names for the Encoders (and Test Packet Generators) are displayed in the user interface to facilitate identification. To make the connection, just click on the corresponding box under Connect. Note that if an encoder channel is not available (either because it is not installed, or because it has been configured for HTTP Live Streaming), it will not show in the list.

Established Connections Table

As connections are established (either in the Connections tab, or as part of the source or output configuration), they are added to the Current Connections table. Regardless of how they are added, the connections can be managed using the functions in this table. An example is depicted below.



Connection Tab — List of Established Connections

The following columns are available in this table.

Source Port

This column indicates the physical port of the connection. The possible values are Encoder 1, Encoder 2, TPG 1 and TPG 2.

Source Name

This column contains the user-defined name for the source.

Output Port

This column indicates the physical output port for the connection. The possible values are Ethernet 1, Ethernet 2, ASI 1 and ASI 2.

Output Name

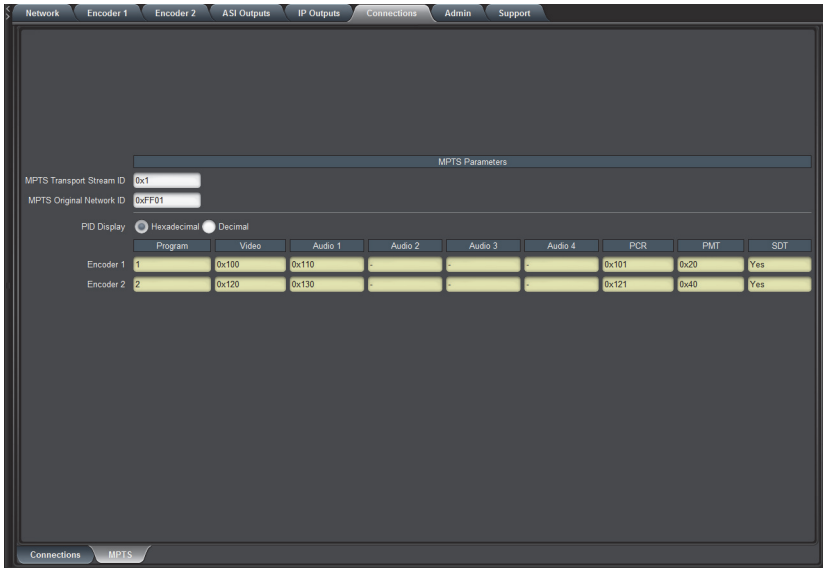
If the Stream Display control at the top of the table is set to Stream Names, this column will have the user-defined name for the output. If it is set to Stream Addresses, it will have the destination IP address and UDP port for IP Outputs, and the values ASI Output 1 and ASI Output 2 for the ASI ports.

Delete

If you click the **Delete** button, the corresponding connection will be deleted.

MPTS Configuration Tab

If two encoder channels are installed in the encoder, the MPTS Configuration tab is available. This tab contains information specific to multiplexing the two encoders into one Multi-Program Transport Stream (MPTS).



Connections Tab — MPTS Tab

As indicated above, the MPTS Configuration tab is divided into two distinct areas:

- **MPTS Parameters** — allows the setting of two MPTS-specific parameters.
- **MPTS PID/Program Allocation** — reports on the actual PIDs and Program numbers used in the MPTS.

MPTS Configuration Parameters

Whenever possible, the MPTS uses the same parameters as configured in the individual encoders. However, there are two parameters that need to be independently set, as follows:

MPTS Transport Stream ID

This field sets the Transport Stream ID for the MPTS formed by multiplexing the two encoders. This field accepts both hexadecimal (starting with 0x) and decimal entries. Valid values are from 0 (0x0) to 65535 (0xFFFF).

MPTS Original Network ID

This field set the Original Network ID to be reported in the MPTS SDT (if enabled). For a discussion of how to set the Original Network ID, refer to the section "**Multiplexer Parameters**" on page 5-20.

Note that this area does not have an **Apply** button; changes take effect immediately and on-the-fly.

MPTS PID/Program Allocation

Since the PIDs and Program Numbers can be set arbitrarily in each encoder, it is possible to select the same values for one or more of these parameters between Encoder 1 and Encoder 2. However, when the bit stream from the encoders is multiplexed into one MPTS, these values have to be distinct.

When building the MPTS, the encoder will use the configured values for each encoder if at all possible. However, if there are any conflicts, the following rules are employed:

1. The PID/Program allocations made for Encoder 1 are used unchanged in the MPTS.
2. If any PIDs configured for Encoder 2 conflict with those from Encoder 1, the Encoder 2 PIDs are remapped to the closest free value. Note that this remapping only happens for the MPTS; ports carrying the bit stream for Encoder 2 only will use the configured values.
3. If the program number is the same for Encoder 1 and Encoder 2, the program number for Encoder 2 in the MPTS will be that of Encoder 1 plus 1. For example, if both encoders are configured to be program 4, Encoder 1 will be program 4 in the MPTS, and Encoder 2 will be program 5 in the MPTS. Both encoders will still be program 4 in their individual SPTS.
4. The MPTS will have an SDT if either Encoder 1 and/or Encoder 2 have the SDT enabled. If only one encoder has the SDT enabled, the MPTS SDT will have only one entry, for that encoder.

The MPTS PID/Program Allocation area reports the actual PIDs and Program Numbers being used in the MPTS. It also reports whether or not the individual SDTs are enabled per encoder.

The **PID Display** control determines whether PIDs are displayed in Hexadecimal or Decimal.

If more audio channels are enabled, their respective PIDs will be displayed as well.

Admin Tab

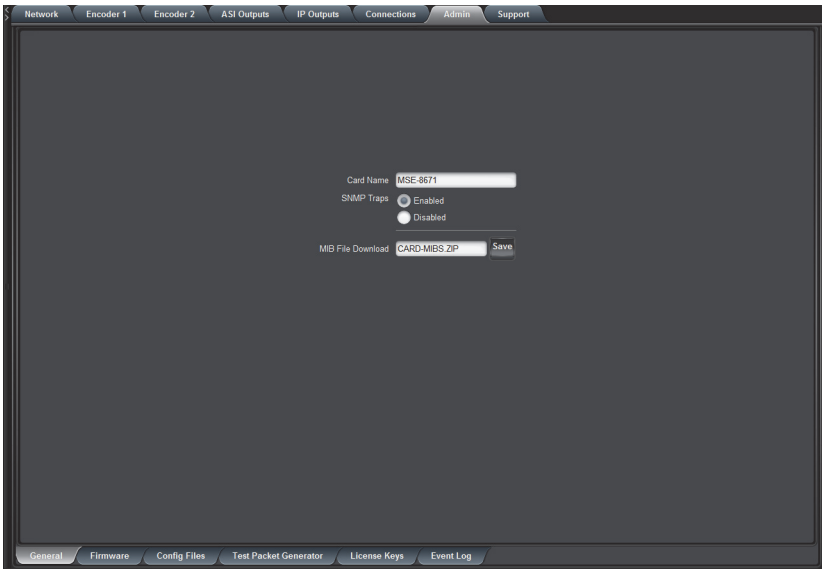
In This Chapter

The following topics are discussed:

- Admin Tab Overview
- General Tab
- Firmware Tab
- Config Files Tab
- Test Packet Generator Tab
- License Keys Tab
- Event Log Tab

Admin Tab Overview

The **Admin** tab contains a number of general administrative functions, each on its own tab.



Admin Tab

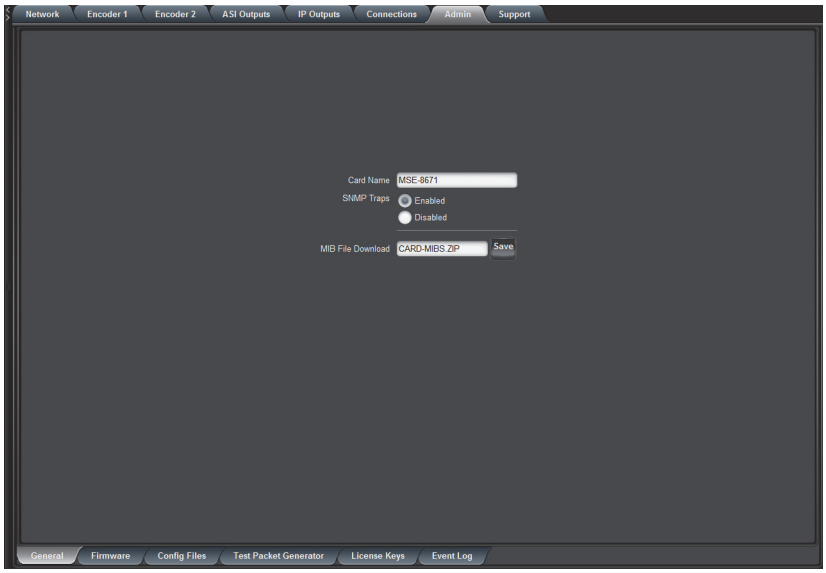
The following tabs are displayed

- **General** — Manages a number of general card parameters; provides an SNMP MIB download.
- **Firmware** — Manages firmware images.
- **Config Files** — The encoder has the ability to store multiple configurations, and it has a number of pre-set configurations as well. These are managed in this tab.
- **Test Packet Generator** — Manages the Test Packet Generators.
- **License Keys** — Contains the current licensing state of the encoder, and allows for new license keys to be entered.
- **Event Log** — The encoder contains a non-volatile event log. It can be inspected and downloaded from this tab.

The Admin status tabs are simplified read-only versions of the corresponding Admin Configuration tabs. They will not be explicitly described here.

General Tab

The General sub-tab includes the following parameters:



Admin — General Tab

Card Name

This field defaults to “MSE-8671” or “MDE-8672” but can be set to any descriptive name. The name provided here will also appear in the DashBoard Tree View.

SNMP Traps

This allows SNMP traps to be enabled or disabled[1]. Note that this setting does not take effect immediately - it will become active the next time the card is rebooted.

MIB File Download

The encoder provides an up-to-date copy of its MIBs. If you click the **Save** button, a zip file with the relevant MIBs will be downloaded to your computer. This zip file contains the card MIBs, as well as the Ross Video and openGear® MIBs required to compile the card MIBs.

1. SNMP is an optional feature in the Network Controller card that is installed in the openGear frame. The encoder SNMP functions are only available if SNMP is licensed in the Network Controller card.

Firmware Tab

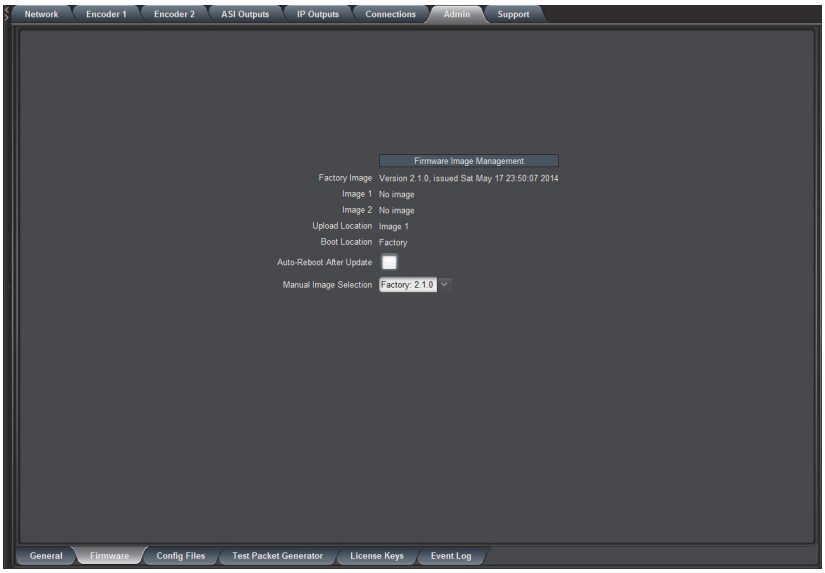
The card can hold up to three distinct firmware images: a Factory image, and two upgrade images, called Image 1 and Image 2. The Factory image can never be overwritten, and will always be available as a fall-back in case of problems or failed updates. Image 1 and Image 2 can be updated at will. Since the card offers two upgrade images, it is always possible to fall back to the previous image if there are any problems with the current one. The card will also automatically fall back to the factory image if it detects a corrupted firmware image. Finally, the push buttons on the front of the card allow for a forced override to the factory image, as described in the section "**Card Overview**" on page 3-7.

The encoder firmware is updated in the same fashion as with any standard openGear card. Once you obtained the upgrade image from Ross Video, place it anywhere in your computer and click the **Upload** button. A dialog box allows you to select the upgrade file. Note that you can simultaneously upgrade all of your encoder cards over multiple frames if you wish.

For More Information on...

- installing and using DashBoard, refer to the ***DashBoard User Manual***.

Note that uploading firmware to the encoder does not affect its operation in any way and does not introduce any glitches in the inputs/outputs, except when running RTMP at high bit rate. If you are running RTMP at high bit rate, uploading firmware to the encoder may cause momentary stream interruptions.



Admin — Firmware Tab

Factory Image, Image 1, and Image 2

These contain version and release date information for the corresponding firmware images. If no image is present, this field will indicate `No Image`.

Upload Location

This field contains the location where the image upload will go. The encoder automatically chooses a location that will not overwrite the currently running image.

Boot Location

This field indicates which image will be used in the next boot. If an image is successfully uploaded through DashBoard, this automatically changes to point to that image. It can also be manually changed.

Auto-Reboot After Update

This field controls whether or not the encoder will automatically reboot after a successful firmware upload through DashBoard. By default, the encoder will not reboot after an update. You can upload the firmware at any time, and reboot later during a maintenance window.

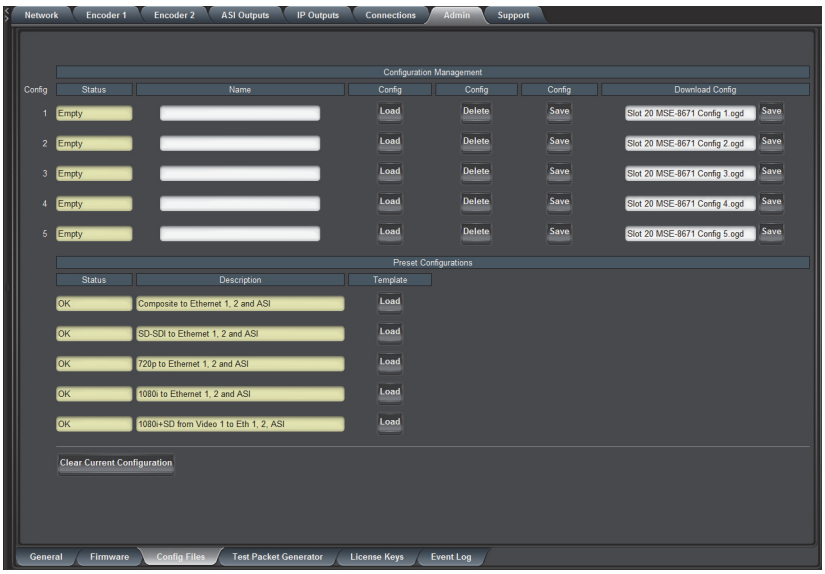
Config Files Tab

As you make configuration changes to the encoder, they are automatically persisted in non-volatile storage. If the card is rebooted or power-cycled, it will come back in the same configuration.

In addition to automatic configuration persistence, the encoder also offers the ability to save up to five complete configurations, load them, and even export them. This can be used to quickly configure it for different scenarios, or for saving configuration "checkpoints" as a complex configuration is built. Since configurations can be exported, they can be archived outside the card as well.

Finally, the encoder also offers five pre-saved configuration templates for some common scenarios.

The layout of the Admin Config Files tab is shown below.



Admin Tab — Config Files Tab

User-Saved Configurations

The fields in the user-saved configuration are located in the **Configuration Management** area of the tab.

Status

This indicates whether there is a saved configuration on that particular slot. It will contain the words Saved or Empty.

Name

This is an optional name for the configuration. It is not required but highly advisable. The name can be edited at any time (even when there is no saved configuration).

Load Button

If you click this button, the corresponding configuration is loaded in the encoder card. It will replace the currently-running configuration. DashBoard will take a few seconds to reload (longer

if you are accessing over a wide-area network), but the actual configuration in the encoder is virtually instantaneous. The **Status** column of the tab will indicate the result of the operation.

Delete Button

If you click this button, the corresponding configuration and its description are deleted.

Save Button

If you click this button, the current card configuration is saved on the corresponding slot, possibly replacing the configuration saved there if it is not empty.

Download Config

If you click the **Save** button, the corresponding file is downloaded to your computer. This feature is provided to allow configuration backups.

Recalling a Save Configuration

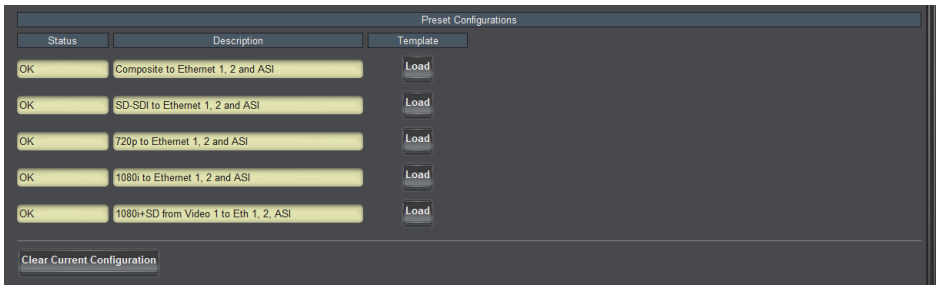
You can save a configuration to your computer, and later restore it to the encoder.

To recall a saved configuration

1. In the Tree View, expand the node for the frame that the encoder is installed in.
2. Double-click the node for the Network Controller card installed in the frame (the card in slot 0).
3. Select the **Data Safe** tab.
4. Clear the **Disable** box corresponding to the encoder you wish to restore the configuration.
5. In the Tree View, right-click on the encoder to display a dialog.
6. Select **Restore Configuration**.
7. Follow the prompts and navigate to the file you wish to restore.

Pre-Defined Templates

The encoder offers five pre-defined configuration templates, as indicated below.



List of Pre-Defined Templates

To load a template, click the **Load** button next to it.

Composite to Ethernet 1, 2 and ASI

This template configures both encoders to run from composite inputs (Encoder 1 from Video 1, Encoder 2 from Video 2). Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.

SD-SDI to Ethernet 1, 2 and ASI

This template configures both encoders to run from SD-SDI inputs (Encoder 1 from Video 1, Encoder 2 from Video 2). Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.

720p to Ethernet 1, 2 and ASI

This template configures both encoders to run from HD-SDI 720p inputs (Encoder 1 from Video 1, Encoder 2 from Video 2). Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.

1080i to Ethernet 1, 2 and ASI

This template configures both encoders to run from HD-SDI 1080i inputs (Encoder 1 from Video 1, Encoder 2 from Video 2). Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.

1080i + SD from Video 1 to Eth 1, 2, ASI

This template configures both encoders to run from an HD-SDI 1080i input connected to Video 1. Encoder 1 runs at full resolution, Encoder 2 downscales the content to SD. Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.

Clear Current Configuration Button

The **Clear Current Configuration** button clears all the configured ports and streams as follows:

- All ASI Ports are set to manual configuration, 20Mbps, 188byte packets.
- All Encoders are stopped and configured with a default set of parameters.
- All IP Outputs are deleted.
- All Connections are removed.
- The Test Packet Generators are disabled.

The button does not affect the following areas:

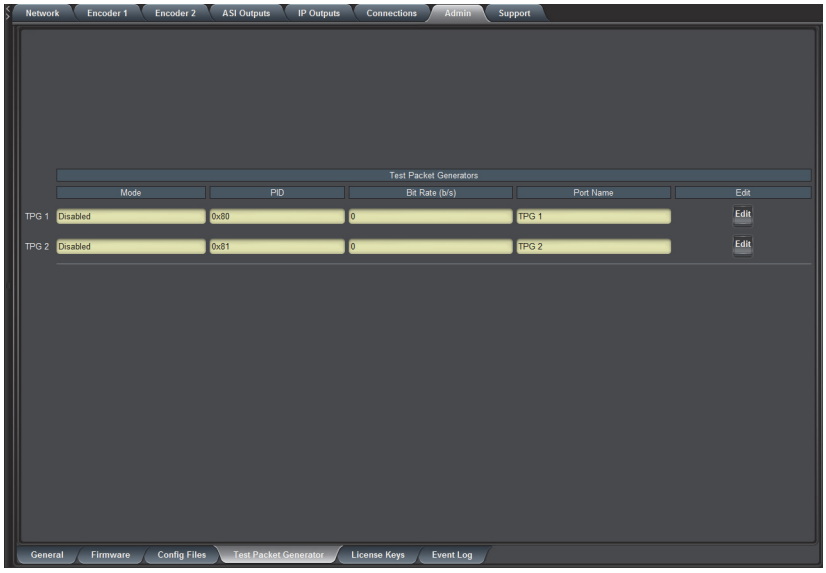
- The settings in the Network tab are not changed.
- The settings in the Admin General tab are not changed.
- Saved configurations are not modified in any way.

DashBoard will take a few seconds to reload (longer if you are accessing over a wide-area network), but the actual configuration in the encoder is virtually instantaneous. The **Status** column in the tab indicates the result of the operation.

Test Packet Generator Tab

The encoder includes two Test Packet Generators (TPG) that are capable of generating a configurable constant bit rate sequence of MPEG-2 Transport Packets with very strict timing. The TPGs are considered a source (input), and are available to be connected to any output. The user interface for the TPGs includes a current status table, which reports the current configuration of the generators.

To configure one of the TPGs, click the **Edit** button on its row. The following configuration parameters are displayed:



Admin Tab — Test Packet Generator Tab

The configuration interface is divided into two areas:

- **TPG Configuration Parameters** — described in this section.
- **Output Selection Connection Parameters** — described in the section "**Destination Selection**" on page 8-2.

TPG Configuration Parameters

This section outlines the configuration settings available in the Test Packet Generator tab.

Port Name

All encoder ports have a user-defined name, to facilitate routing. Enter any suitable name.

Mode

This field controls the type of MPEG-2 transport packets generated. The options are:

- **Disabled** — TPG is disabled. No packets are being generated.
- **NULL Packets** — TPG is generating NULL packets. If you select this option, the PID parameter becomes read-only with the value 1FFF.
- **Ramp48 Packets** — TPG is generating packets with a "`Ramp48 Payload`". A "`Ramp48 Payload`" is composed of the bytes 0x48, 0x49, 0x4A, …, 0xFF. Generated packets have the Payload bit set, no Adaptation Field, and a valid Continuity Counter field.

- **PCR Packets** — TPG is generating packets with a valid PCR field (stamped corresponding to the packet's departure time at the configured bit rate). The packets have a small payload with random data, so the Continuity Counter field is valid and counting.

PID

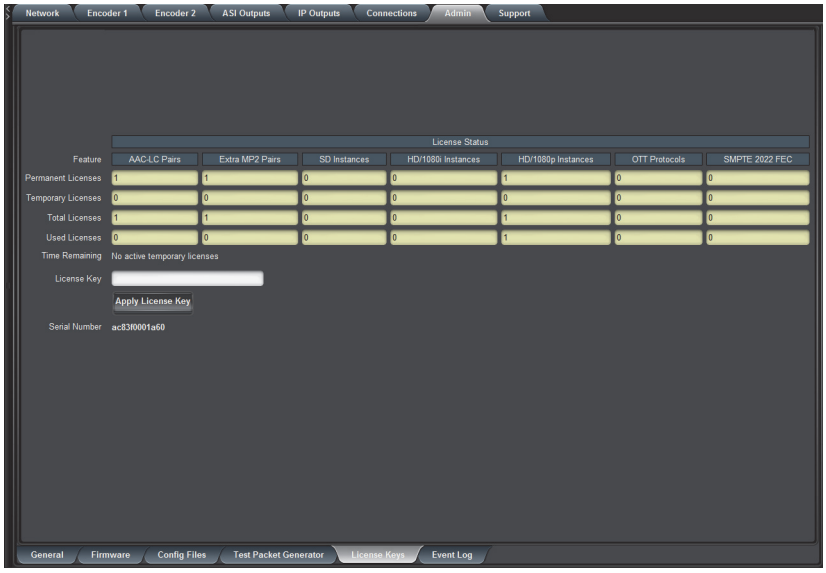
Controls the PID of the generated packets. This field accepts both decimal and hexadecimal values (prefixed with 0x).

Bit Rate

Controls the bit rate of the generated packets. The minimum value is 64,000bps and the maximum value is 213,000,000bps.

License Keys Tab

The encoder has a number of optional licensable features. The License Keys tab is used to manage these features. Using this tab, you can verify how many licenses you have for each optional feature, and how many you are currently using.



Admin — License Keys Tab

The encoder has the concept of a temporary license. If you want to try out a certain feature, contact Ross Video. You will receive, free of charge, a license key that enables that feature for a specific period of running time (license time does not "count" when the card is off).

The License Keys tab includes a License Status table, and a Configuration area, as shown above. The table rows are license counts, and the columns correspond to different licensable features. The rows are:

- **Permanent Licenses** — This is the number of non-expiring licenses for each feature.
- **Temporary Licenses** — This is the number of temporary licenses for each feature. Once the license period expires, they are removed.
- **Total Licenses** — This is the total number of licenses for each feature. It is simply the sum of the permanent and temporary licenses.
- **Used Licenses** — This is the number of licenses in use for each feature by the current card configuration.

If you have temporary licenses, the **Time Remaining** field indicates how long until they expire. If you do not have temporary licenses, this field has the message "`No active temporary licenses`".

License Status

The table columns correspond to the licensable features as outlined in this section.

AAC-LC Pairs (AAC-8671)

The encoder requires one AAC-8671 license per instance of AAC-LC stereo encoding. Note that AAC-LC is required for the operation of some OTT protocols.

Extra MP2 Pairs (MPA-8671)

One MPEG-1 Layer II license (MPA-8671) is included with each encoder channel. This field counts the additional licenses.

SD Instances, HD/1080i Instances

These standard licenses define the maximum output resolution for the encoder. By default, one license is activated for the MSE-8671 and two licenses for the MDE-8672.

OTT Protocols

Over-The-Top (OTT) Protocols are HTTP Live Streaming and RTMP. Licenses in this column are applicable to both protocols. Each instance of either protocol requires a license. By default, this feature is licensed for each encoder.

Note — *RTMP only supports AAC-LC audio; the encoder must have AAC-LC licenses to run RTMP. The HLS protocol does not require AAC-LC, but may mobile devices that support HLS only work with AAC-LC.*

FEC (SMPTE 2022) License

The FEC-8671 license feature enables Forward Error Correction (FEC) for the encoder. This is not a counted feature; if FEC is enabled, the corresponding number is 1; if it is disabled, the corresponding number is 0. The Used Licenses field will be set to 1 if there is at least one FEC instance in use.

1080p Processing License (HDP-8671, HDP-8672)

The HDP-8671/HDP-8672 license feature enables 1080p 59.94Hz and 1080p 50Hz processing for the MSE-8671 and MDE-8672 respectively.

Requesting a License Key

If you want to request a license key from Ross Video, you will need to provide the card serial number. It can be found in the **Product** status tab and in the **License Key** sub-tab of the **Admin** tab as well.

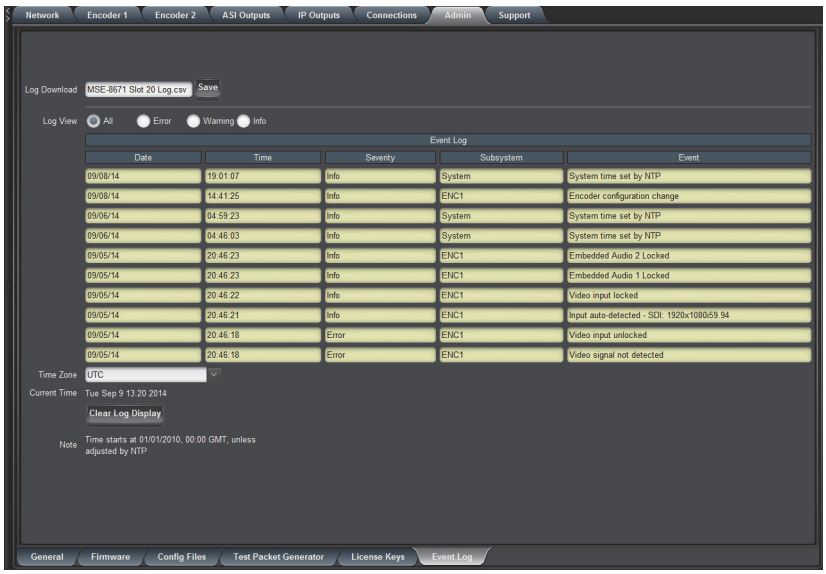
Once you receive the key from Ross Video, enter it in the **License Key** field, and click the **Apply License Key** button. If the key is accepted, the message `License Key Installed OK` is displayed.

If there are any problems, an error message in the same location. The following are the possible error messages:

- **Invalid key** — missing characters: the key you entered is too short. Double-check that you entered all the characters. Ensure to press **Enter** after entering the key.
- **Invalid/Corrupted Key** — the key you entered has the correct number of characters, but it is invalid. Double check what you entered.
- **Serial number mismatch** — this key is for serial xxxxxxxxxxxx: encoder license keys are specific to a card. You entered a valid license key, but it is intended for a different card, whose serial number is displayed in the message. You must use this key on the correct card.
- **This key has already been applied** — License keys can only be applied once. This is a valid key for this card, but you have already applied it, and its features are already available.

Event Log Tab

The encoder includes an Event Log in non-volatile storage. This event log can be used for fault-finding, and to check for error conditions.



Event Log Tab

The following information is included in each encoder event in the log.

Date

The calendar date in which the event occurred.

Time

The time at which the event occurred. Refer to the section "**Timestamps**" on page 9-14 for details.

Severity

The severity of the event. The encoder defines three severity levels:

- **Error** — These are events that affect the operation of the device. For example, an ASI Input loosing lock or an IP Input no longer receiving packets. An error will impact service until addressed.
- **Warning** — These are events that may produce visible glitches, but they do not have a continuous service impact. Examples of warnings are automatic redundancy switches and ARP renewal failures.
- **Info** — These are informational events. All configuration actions are logged with this severity. When an error is cleared (for example, a video input regains lock), the event is logged with this severity as well.

Subsystem

The subsystem affected by the event. This may be a port, a stream, or the card itself.

Event

This is a textual description of the event. The encoder will store up to about 400kbytes of logs in non-volatile memory. When that limit is reached, the oldest half of the stored logs will be deleted to make space for new logs.

Timestamps

The encoder does not have a battery-backed real-time clock. It depends on the frame controller to obtain the current date and time, and the frame controller depends on an external Network Time Protocol (NTP) server to obtain current date and time. By default, the encoder will initialize its internal time-of-day clock to January 1, 2010, GMT. If the frame controller is NTP-synchronized, the encoder will then accept time from it and set its time-of-day clock accordingly.

In order to configure the frame controller for NTP, open its configuration tab on DashBoard, select the Network tab, and enter the IP address of an available NTP server. Refer to the ***MFC-OG3 Series*** or ***MFC-OG3 Series User Manual*** for details.

If your frame controller has access to the Internet, you can point it to one of the public NTP servers for your region.

Other Fields in the Event Log Tab

The full Event Log tab includes the following fields and menus.

Log Download

The user interface only displays the last 10 events of each type. If you would like to see the whole event log, it can be downloaded to your computer by clicking **Save**. The log will be in CSV format, and it can be opened by any utility that can read text files; ideally, you should use a spreadsheet program, such as Microsoft® Excel®, so it is presented in tabular form. The log will be in chronological order, oldest entry to newest.

Log View

The user interface can display the last 10 events. You can choose to see the last 10 events of any kind by selecting **All**, or you can restrict the view only to **Info**.

Warning, or Error

This setting does not affect the log download, it only affects what is displayed.

Event Log

This table presents the last 10 events of the selected type.

Time Zone

To simplify the correlation of the events with your local time, you can set to your time zone using this drop-down menu. The encoder presents a simplified list, with standard GMT offsets. Note that standard GMT offsets do not change back and forth with Daylight Savings; you will need to make this adjustment manually if it is relevant to you.

Current Time

This field indicates the encoder view of what the current date and time is. If your frame is not NTP-synchronized, this is useful to figure out “how long ago did this event happen”.

Clear Log Display

Clicking this button clears all log views. This is useful to quickly identify any new events after the encoder is set up. Note that this action does not clear the logs stored in non-volatile memory.

Note — *The encoder will store up to approximately 400kbytes of logs in non-volatile memory. When that limit is reached, the oldest half of the stored logs will be deleted to make space for new logs.*

Playing Video on a Web Page

In This Chapter

The following topics are discussed:

- Overview
- Web Pages Served by the Encoder
- Multicast Streaming
- HTTP Live Streaming
- Direct HTTP Streaming
- Using a Firewall

Overview

In general, there are two ways of playing video on a web page:

- Using the HTML5 <VIDEO> tag, for browsers that support it, or
- Using a web-browser plug-in

Using HTML 5

Unfortunately, the HTML5 standard did not actually specify what type of audio/video encoding and container was to be supported. Therefore, even though the current versions of all major browsers support the <VIDEO> tag, there is no single format that will work on all browsers. Moreover, since the encoder is an encoder designed primarily for the broadcast market, it uses the transport stream container, which is not supported natively by any browser[1]. Therefore, it is not possible to use the HTML5 <VIDEO> tag with content generated by the encoder.

Using a Web-browser Plug-in

In order to play the bit stream coming from the encoder in a web page, a plug-in with the appropriate audio, video and container support must be installed in the web browser. The open-source VideoLAN™ player includes appropriate plug-ins that will work with the bit stream coming from the encoder card.

There are two types of plug-ins:

- Windows® ActiveX® controls, used by Windows® Internet Explorer®
- Mozilla® (Netscape) style plug-ins, used by most other browsers (Mozilla® Firefox®, Google® Chrome™, Apple® Safari®)

When installing the VideoLAN player, make sure to select the appropriate plug-ins for the browsers you intend to use. If multiple browser support is required, both types of plug-ins can be selected (but at least one “Mozilla-style” browser must be already installed).

We recommend VideoLAN version 2.0.1 or later. Earlier versions did not support HTTP Live Streaming.

Web Browser Support

The web pages generated by the encoder are known to work with the VideoLAN plug-in versions 2.0.1 to 2.0.5 and the following web browsers:

- Windows® Internet Explorer® versions 9.0.2 - 9.0.13
- Mozilla® Firefox® versions 7.0 - 19.0
- Google® Chrome™ versions 14.0.835.186 - 24.0.1312.57
- Apple® Safari® 5.1 - 5.1.7

Other browsers and operating systems may work, as long as the VideoLAN plug-in is installed.

1. A number of browsers support the MP4 container format, but this container does not support real-time encoded video.

Web Pages Served by the Encoder

The encoder automatically generates web pages that will display the video being encoded, depending on the output mode of the encoder channels (refer to the Encoder Connections Tab section). The pages will be available for the following output protocols:

- ASI/IP Streaming, as long as IP Outputs with multicast destination IP addresses have been defined.
- Direct HTTP Streaming.
- HTTP Live Streaming, when configured to use the local server.

The web pages generated by the encoder assume that the VideoLAN plug-in has been installed to provide playback services.

Getting Started

To get started, point a web browser to the IP address of the desired encoder Ethernet port:

```
http://encoder_ip
```

The encoder will respond with a web page with the appropriate links to access the streams, depending on the current configuration. Note that the pages served by each Ethernet port may be different; for example, if the encoders are set to ASI/IP streaming, and no IP Outputs are defined for a given Ethernet port, the web page served from it will indicate that there are no streams available.

The following are examples of how these web pages look like, depending on the encoder settings.

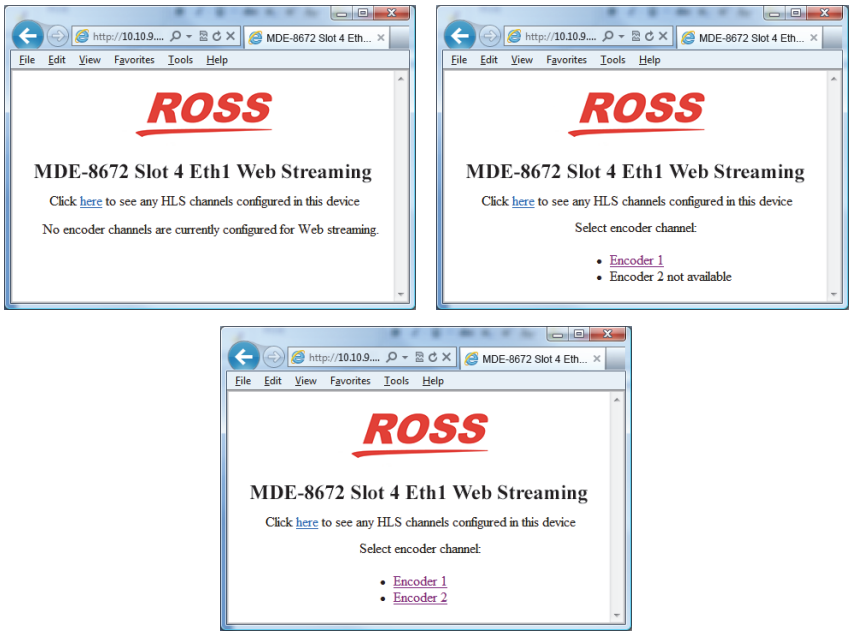

MDE-8672 Slot 4 Eth1 Web Streaming
Click here to see any HLS channels configured in this device
No encoder channels are currently configured for Web streaming.
MDE-8672 Slot 4 Eth1 Web Streaming
Click here to see any HLS channels configured in this device
Select encoder channel:
Encoder 1
Encoder 2 not available
MDE-8672 Slot 4 Eth1 Web Streaming
Click here to see any HLS channels configured in this device
Select encoder channel:
Encoder 1
Encoder 2

Figure 10.1 *Example Web Pages*

Multicast Streaming

If an encoder is connected to IP Output ports configured for multicast streaming (i.e., with a destination IP address in the range of 224.0.0.0 to 239.255.255.255), the encoder will generate a web page for that output in the relevant Ethernet port. Note that the video will only actually play if the network between the client and the encoder supports multicast. This will typically be the case if the encoder and the client are in the same subnetwork, but may not work across routers unless they have multicast support enabled, and will definitely not work across the Internet.

Figure 10.2 illustrates the relevant pages. Both UDP and RTP are supported.

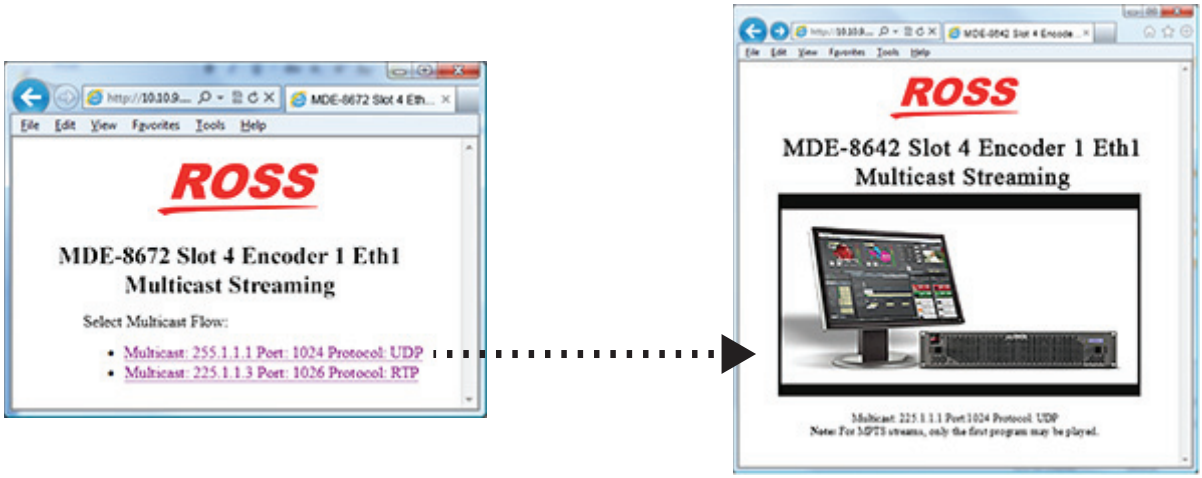


Figure 10.2 *Example Web Pages*

If you configure an MPTS stream (i.e., both encoders routed to the same IP Output), the page will be available for both encoders, but the plug-in will only play the first channel (Encoder 1). Also, the plug-in will only play the first audio PID, even if secondary audio is configured.

HTTP Live Streaming

All the web pages accessible from the Ethernet ports of the encoder include a link for the built-in HTTP Live Streaming server page:

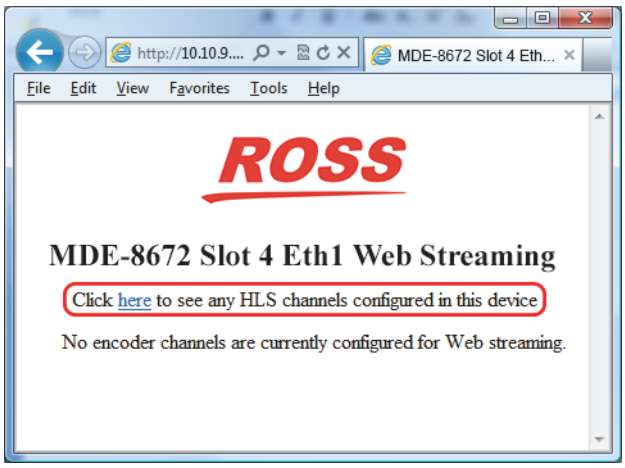

http://10.10.9....
MDE-8672 Slot 4 Eth...
File Edit View Favorites Tools Help
ROSS
MDE-8672 Slot 4 Eth1 Web Streaming
Click here to see any HLS channels configured in this device
No encoder channels are currently configured for Web streaming.

***Figure 10.3** Example of a HTTP Live Streaming Server Page*

If the IP address of the port being accessed is `xxx.xxx.xxx.xxx`, the available local HLS channels can also be accessed through this direct link:

`http://xxx.xxx.xxx.xxx/HLS/`

The page accessed through this link will display a list of available local HLS channels, with the value configured for Program Name as the label.

Note — *HLS channels configured for remote servers will not be listed in this page, as the encoder has no way of knowing the actual link to these channels*

Clicking on the link will cause the content to play. For Apple® devices, this will launch the built-in media player; for PCs running Windows® (and possibly Linux®), if the VLC plug-in is installed, the video will play in the web page.

Direct HTTP Streaming

If an encoder channel is configured for Direct HTTP Streaming, the selection happens as depicted in **Figure 10.4**. Unlike multicast, Direct HTTP Streaming will work over the Internet as long as the path from the encoder to the client has sufficient bandwidth. Direct HTTP Streaming is always available on both Ethernet ports.

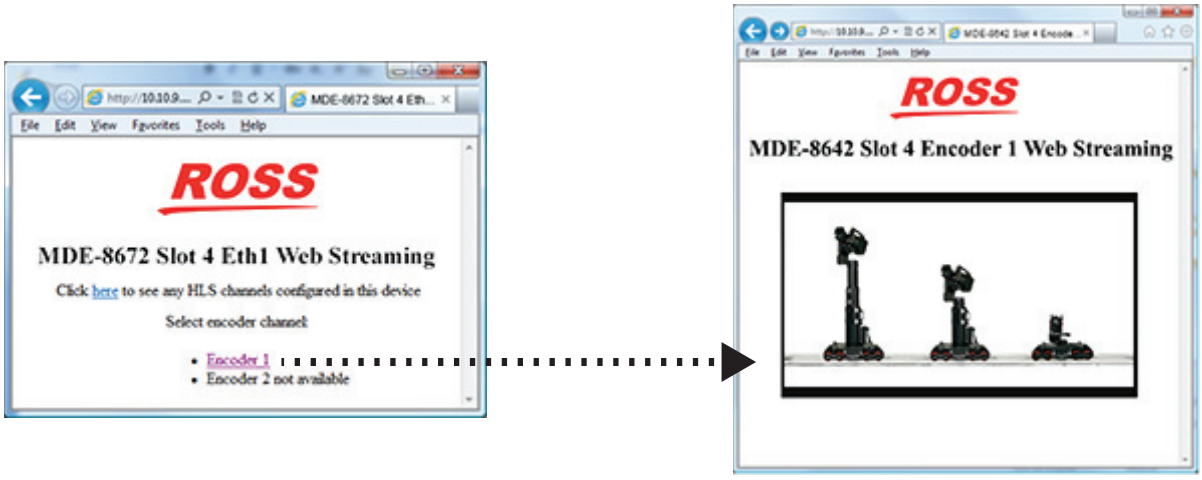

ROSS
MDE-8672 Slot 4 Eth1 Web Streaming
Click here to see any HLS channels configured in this device
Select encoder channel
Encoder 1
Encoder 2 not available
ROSS
MDE-8642 Slot 4 Encoder 1 Web Streaming

Figure 10.4 *Example of Direct HTTP Streaming Pages*

If the card is required to support clients on remote networks, make sure that a Default Gateway is entered in the corresponding Ethernet port configuration (refer to the chapter "**Network Tab**" on page 4-1 for details). When replying to a request, the card will always use the Ethernet port where it received the request from.

Using a Firewall

Since both Direct HTTP Streaming and HTTP Live Streaming work over the Internet, in some situations it may be desirable to do so (for example, to allow for remote monitoring). Ross Video believes it is safe to connect the encoder Ethernet ports directly to the Internet with a public IP address; however, this may not be desirable. It is possible to place a port-forwarding firewall between the encoder and the Internet; the web pages and the streaming will still work as long as the firewall is configured not to remap the Direct HTTP Streaming Listening Port (refer to the section "**Direct HTTP Streaming**" on page 10-6). For example, if the Listening Port is configured to be 8000, the firewall must be configured to remap external port 8000 to internal port 8000. The reason for this requirement is that the plug-in needs to know the listening port, and that value is passed to it by the automatically-generated pages from the encoder.

Status Menus

In This Chapter

This chapters summarizes the read-only information displayed in the **Status** tabs. The fields in the **Status** tabs can vary in severity from green (valid), yellow (caution), to red (alarm). DashBoard reports the most severe alarm for a single field. Alarm colors are noted within the tables as text set in brackets next to the menu parameter name.

The following topics are discussed:

- Product Tab
- Network Status Tabs
- Encoder Status Tabs
- ASI Outputs Status Tab
- IP Outputs Status Tab
- Connections Status Tab

Product Tab

The **Product** tab contains basic information about the encoder.

Table 11.1 Product Tab Items

Tab Title	Item	Parameters	Description
Product	Build Date	#	Date the firmware image was built
	Supplier	Ross Video Ltd.	
	Product	MSE-8671 or MDE-8672	
	Software Rev	xx yy zz	Indicates the firmware revision currently running where: • xx represents the Major Version • yy represents the Minor Version • zz represents the Build Number
	Serial Number		Displays the serial number of this encoder.
	Hardware Version	#	Indicates the board version number.
	Rear Module	OK (Green)	The encoder supports the rear module it is currently installed with.
		Not Installed (Yellow)	The card is not connected to a rear module. The card is operating normally, but it will not be useful as there are no input and output connections to it.
		Wrong Module (Red)	The encoder is connected to a rear module that is not supported. Depending on the signals present on that module, there may be a small chance of damage to the encoder; Ross Video recommends that this situation be rectified immediately. This alarm will cause the front status LED to turn red. Refer to the section "**Supported Rear Modules**" on page 3-3 for details on which rear module is supported by your encoder.
	Analog Audio Input	#	Indicates the type of analog audio input
		Unknown	The rear module is not supported.
	Card Uptime	#	Indicates how long the card has been running since it was last rebooted.
	Ambient Temp	#	Temperature, in degrees centigrade, of the air intake of the card (measured at the front edge of the card).
	Internal Temp		Temperature, in degrees centigrade, at the back of the card.
	MDP Core Temp[a]		Temperature, in degrees centigrade, of the core processing element.

a. The openGear frame is designed to operate in environments with up to 40°C ambient. There is typically a 5°C temperature raise from the external ambient to the Ambient Temperature measured by the encoder. If that measurement is at 45°C or higher, action must be taken to cool down the ambient temperature.

Network Status Tabs

The **Network** status tab is subdivided into the same tabs as the **Network** tab, namely Interfaces and DNS.

Interfaces Tab

The **Interfaces** tab reports the current IP configuration of each Ethernet port, as well as their link state and running status. **Table 11.2** summarizes the read-only information displayed in the **Interfaces** status tab.

Table 11.2 Interfaces Status Tab Items

Tab Title	Item	Parameters	Description
Ethernet # Configuration	Alarm on Link Loss	#	Reports the current setting of this parameter on the Network tab
	IP Address	##.##.#.###	Reports the current IP address for the port
	Subnet Mask	###.###.###.#	Reports the current subnet mask for the port
	Default Gateway	#	Reports the current default gateway for the port
	Interface Speed	#	Reports the current setting for this parameter on the Network tab
	Port # Link	Link OK (Green)	The port has established link with the network connection
		Half-Duplex Link (Yellow)	The port is set to Auto-Negotiate, and it has achieved 100Mbps Half-Duplex link with the network connection. Half-Duplex links are not suitable for video communication. The port will operate, but we recommend that this be addressed. If Alarm on Link Loss is set to Yes, the Card State status is yellow if there are no higher-priority alarms present.
		No Link (Red)	The port does not currently have link. If Alarm on Link Loss is set to Yes, the Card State will be red and the Status LED in the front of the board will also be red. If Alarm on Link Loss is set to No, this indicator will still be red, but the alarm will not propagate.

Table 11.2 Interfaces Status Tab Items

Tab Title	Item	Parameters	Description
Ethernet # Configuration	Port # Status	OK (Green)	The port is operating correctly.
		TX Overflow (Red)	In the current configuration, the IP outputs are attempting to transmit more than the port capacity (i.e., the overall output data for this port exceeds the interface speed of 100Mbps or 1Gbps). The Card State will be red and the Status LED in the front of the board will also be red. In this case, reduce the output bit rate (either by reducing the encoder bit rates or by removing output ports). **If this indicator is red, data is being dropped.**
	Link Speed (Mb/s)	#	Reports the actual speed negotiated with the switch for the port. If the port has no link, the value reported here is zero (0).
	MAC Address	#	Reports the MAC address of the Ethernet port.

Encoder Status Tabs

Each Encoder Status tab provides a summary of the current status of the specified encoder. The variables displayed in this tab vary according to the encoder configuration.

The Basic, Advanced and Connections tabs are direct equivalents of their configuration counterparts. They present the current value of each of the configuration parameters. When the Apply/Cancel buttons are grayed out, the contents of these tabs exactly match their configuration counterparts. When the Apply/Cancel buttons are active, configuration parameters may have been changed. The current (running) encoder configuration can still be inspected in the status tabs, prior to clicking on the Apply button.

Table 11.3 Encoder Status Tab Items

Tab Title	Item	Parameters	Description
Status	Encoder # Status	OK (Green)	The encoder is running normally.
		Stopped (Yellow)	The encoder has been manually stopped (refer to the section "**Using the Basic Tab**" on page 5-9).
		Error (Red)	The encoder should be running but it is not. This status will be briefly shown when the encoder is starting. The possible causes for this are: • The encoder has no input (check the corresponding Encoder Video Status field) • There is a mismatch between the video input signal and the encoder configuration. For example, the input is 1080i and the encoder is configured for 720p.
	Encoder # Video Status	Locked (Green)	This indicates whether or not the selected video input front-end is locked. This status is also reflected in the rear module LED next to the video input.
		Unlocked (Red)	
	Video Detected	Composite #	An analog composite video signal is detected. Refer to the section "**Notes on the Video Detected Field**" on page 11-7 for details.
		SDI #	A digital video SDI signal is detected.
		No signal	No recognizable video signal is detected.
	Encoder # Embedded Audio[a]	Present (Green)	Embedded audio is present in the selected Group/Combination.
		Not Present (Yellow)	The SDI input has no lock, it is not possible to determine whether embedded audio is present or not.
		Not Present (Red)	Embedded audio is not present in the selected Group/Channel combination. Check the source settings, or select a different Group/Channel combination.

Table 11.3 Encoder Status Tab Items

Tab Title	Item	Parameters	Description
Status	Encoder # Audio Status[b]	OK (Green)	No errors detected.
		Not Present (Yellow)	Embedded audio is not present - errors cannot be detected. This status will be issued when there is no SDI lock, or when there is no embedded audio.
		Error (Red)	Embedded audio errors are being detected. If this indicator is red, audio is corrupted or has glitches. The possible causes for this are: • Corrupted embedded audio in the input - checksum errors • Audio sampling rate mismatch • The channel is configured for Dolby® Pass-through, and the data present in the selected Group/Channel is not Dolby® AC-3®.
	SDI Standard	Unlocked	Reports the detected SDI signal.This is useful to resolve SDI signal mismatch issues (for example, when the input signal is SD SDI and the encoder is configured for HD).
		SD SDI	
		HD SDI	
	Closed Captions	Present	This field reports Closed Caption insertion. If Closed Captions are enabled, the encoder reports whether or not it is receiving them. Note that it is possible for the encoder to be receiving closed caption data that is empty (without actual captions). These will be reported as Present.
		Not Present	The possible reasons are: • If the caption source is EIA-608 Line 21, it means that the encoder cannot find a valid closed caption waveform on that line. • If the caption source is SMPTE-334 VANC, it means that the encoder is either not receiving closed caption messages, or it is receiving EIA-708 messages without a caption field.
	Encoder Passthrough[c]	Dolby AC-3, #kb/s	The data in the selected group/pair has been correctly identified as Dolby® AC-3®; its bit rate is reported here.
		Unknown Format	Data is present in the selected group/pair, but it is not Dolby® AC-3®.
		Not Present	There is no data in the selected group/pair

Table 11.3 Encoder Status Tab Items

Tab Title	Item	Parameters	Description
Status	AFD	Code #	If AFD insertion is enabled, the encoder reports it is receiving them, and what AFD code is being inserted where # is the current AFD code being inserted. • If AFD Source is set to Manual AFD Selection, this field will report the selected manual code. • If the input is SDI, the encoder reports the detected type of SDI signal
		Not Present	No AFD is being received.
	Transport Rate	#	This indicates the overall transport rate, including NULL packets, coming out of the encoder subsystem. • If you are connecting this encoder to an IP Output or ASI port in manual rate mode, the configured bit rate must be at least this value. • If you are connecting this encoder to an IP Output with padding disabled, the actual rate will be lower than this value as the NULL packets will be stripped from it.

a. This indicator flags whether or not embedded audio is actually present on the selected Group/Channel combination. The actual indicators displayed depends on the individual settings of each audio channel. The actual indicators displayed depends on the individual settings of each audio channel.
b. The status of each audio channel is displayed.
c. This field is only displayed if Dolby® Pass-through is configured. This indicator contains the status of the Dolby® AC-3® Pass-through function

Notes on the Video Detected Field

If there is any recognizable video signal at the encoder video input, this field will indicate what type of signal the encoder is detecting. This detection is independent of the video input settings and is intended to aid the operator in making the correct selection.

For the detected video signals, the encoder will provide further information on the type of signal, as follows:

For Composite signals, the encoder will further report the encoding system, as follows:

- Systems with 59.94 fields/sec: NTSC
- Systems with 50 fields/sec: PAL B/G

For SDI signals, the encoder will indicate additional information, as follows:

- For Standard Definition and High Definition signals, this field will report resolution, frame/field rate, and whether the signal is progressive or interlaced. Examples: SDI: 1920x1080i59.94, and SDI: 1280x720p50.
- For High Definition signals whose resolution is not 1920x1080 or 1280x720, the encoder will report the input as SDI: unknown. Encoding of such signals is not supported by the MSE-8671 or MDE-8672.

HTTP Live Streaming Status

If HTTP Live Streaming is selected in the Encoder Connections tab, four more indicators are added to the Encoder Status tab.

Table 11.4 HTTP Live Streaming Status Items

Tab Title	Item	Parameters	Description
	IP Output Rate	# bits/second	Reports the average transfer rate into the server, averaged over the last segment.
	Segments Transferred	#	Reports the number of bit stream segments successfully transferred so far
	HTTP Dropped Segments	#	Reports the number of segments dropped
	HTTP Transfer Errors	#	Reports the number of errors encountered while transferring segments

HTTP Dropped Segments

A segment will be dropped if the previous segment has not been completely transferred when it becomes ready. A non-zero count here indicates that there is a performance problem between the encoder and the server - either in the network (not enough bandwidth) or in the server (not enough CPU power/disk bandwidth). If the segment size is small (3 seconds or less), increasing the segment size may improve the situation.

HTTP Transfer Errors

These may be network errors, or may be configuration errors. The exact error description will be shown in the configuration area, in the area on top of the Apply button. One example is where the server is not responding due to an incorrect IP address.

Direct HTP Streaming Status

If Direct HTTP Streaming is selected in the Encoder Connections tab, three indicators are added to the status area.

Table 11.5 Direct HTP Streaming Status Items

Tab Title	Item	Parameters	Description
	IP Output Rate	#	Reports the aggregate average bit rate to all connected clients (so it can be higher than the transport rate)
	Connections	#	Reports the number of clients currently connected to this encoder
	Dropped Packets	#	Reports the number of transport packets dropped over the current connections. Once a connection terminates, the dropped packet count for that connection is reset

RTMP Status

If RTMP is selected in the Encoder Connections tab, five indicators are added to the status tab.

Table 11.6 RTMP Status Items

Tab Title	Item	Parameters	Description
	IP Output Rate[a]	#	Reports the average bit rate transferred to the server. It will be lower than the transport rate due to the lower container overhead used by RTMP. It is possible for the IP Output Rate to be less than the intrinsic bit rate of the encoder for short periods of time, depending on server and network conditions. The encoder will buffer the bitstream and attempt to "catch up" in these cases. If it cannot, audio/video bitstream data may be dropped.
	Encoder RTMP Status	Connected (Green)	The encoder has established a connection with the RTMP server and is transferring data
		Waiting for Encoder (Yellow)	The encoder is not attempting to connect to the RTMP server. The reasons are: • The encoding core is not running (i.e., the encoder is not generating bit stream). This can be because the encoder is explicitly stopped (Encoder State set to Stopped in Basic Tab - General Configuration) or it has no valid input. • The RTMP output is configured not to connect to the server (Connect set to No in the RTMP configuration section).
		Not Connected (Red)	The encoder is running, but it is unable to connect to the RTMP server because: • the encoder cannot contact the server, or • the RTMP parameters are incorrect • the server was specified as a host name, and the encoder cannot convert that to an IP address (e.g. no DNS, or the server name is misspelled) Check the Admin Event Log tab settings.
	Server Connection	#	Indicates which server (Primary or Backup) the encoder is currently connected or attempting to connect. RTMP can be optionally configured with a primary and a backup server. If the primary server cannot be contacted, the encoder will attempt to connect to the backup server.

Table 11.6 RTMP Status Items

Tab Title	Item	Parameters	Description
	Video Buffer%	#	These buffers are used to temporarily store the bit stream if there is no enough network and/or server bandwidth. However, if this situation persists, the buffers start to fill up. These indicators report the current state of the buffers. If they overflow, data is dropped. Ideally, these buffers should be almost 0.
	Audio Buffer%	#	
	Dropped Packets		If the buffers overflow, data is dropped. The encoder will drop entire access units (an audio block or a video frame). This indicator has a count of the number of access units dropped for the current connection. This count resets when a new connection is established.

a. It will be lower than the transport rate due to the lower container overhead used by RTMP. It is possible for the IP Output Rate to be less than the intrinsic bit rate of the encoder for short periods of time, depending on server and network conditions. The encoder will buffer the bit stream and attempt to “catch up” in these cases. If it cannot, audio/video bit stream data may be dropped.

ASI Outputs Status Tab

The ASI Outputs status tab for the ASI Ports provides a quick visual summary status for the ports.

Table 11.7 ASI Ports Status Items

Tab Title	Item	Parameters	Description
ASI Output Summary	ASI Output #	TX OK (Green)	The port is operating normally in transmit mode (ASI Output).
		TX Overflow (Red)	The connected bit rate is excessive. The DashBoard Card State will be red and the Status LED in the front of the board will also be red. To correct this problem, either reduce the connected bit rate, or increase the ASI output bit rate, or configure the port in Automatic mode. **If this alarm is active, data is being dropped**.
		TX Unlocked (Red)	The port is in automatic bit rate, and there is no data rate coming to it. Any downstream ASI receivers will lose lock. DashBoard Card State and the Status LED will be red if there is a connection to this port.

IP Outputs Status Tab

The status tab for the IP output ports contains a summary of each stream status. There are two sub-tabs: one for Ethernet 1, and another for Ethernet 2.

Table 11.8 IP Outputs Status Items

Tab Title	Item	Parameters	Description
IP Output Port # Summary	IP Output #	OK (Green)	The IP Output is operating normally (either streaming or ready to stream).
		No Response (Red)	The IP Output is configured for unicast operation, but it does not have a destination MAC address. If there is a connection to this output, DashBoard Card State and the Status LED will be red.
		Overflow (Red)	The IP Output is configured for NULL Padding with a manual rate, and the connected bit stream(s) exceed that configured manual rate. If this alarm is asserted, packets are being dropped. The DashBoard Card State and the Status LED will be red.
		No Response (Yellow)	The IP Output is configured for unicast operation, and the destination stopped responding to ARP. The IP Output is using an old cached MAC address. If there is a connection to this output, the DashBoard Card State will be yellow (but packets are being transmitted).
		Disabled (Grey)	The IP Output has been disabled (by setting Enable to No).

Connections Status Tab

The Connections status tab includes all connected input/output status indicators and an overall summary status indicator, which allows the operator to immediately pinpoint errors. This information is divided into two sub-tabs: Connections and MPTS.

Connections Tab

The Connection status tab presents the combined status of all the established connections, in one location. It includes the Source Port, Source Name, Output Port and Output Name fields to identify the connections, and the rows are in the same order as the table in the Configuration tab. The status tab contains two additional fields, the Source Status and the Output Status. Since these are color-coded, it is simple to quickly identify any problems. If any of the Source Status or Output Status indicators are red, the DashBoard Card State will be red as well, and the Status LED in the front of the card will also be red.

Table 11.9 Connections Status Items

Tab Title	Item	Parameters	Description
Established Connections	Source Status	OK (Green)	The stream is operating normally. If it is an encoder, it means that it is operating normally If it is an output, it means that it is either transmitting or ready to transmit.
		Warn (Yellow)	The stream is configured but disabled. Simply enabling the stream may clear this situation.
		Error (Red)	The stream is configured but has detected a problem. If it is an encoder, it is not running. If this is an output, it normally means that the output is either unable to send (e.g., an IP output configured for unicast but unable to find the destination MAC address) or dropping packets (e.g., an oversubscribed ASI or IP output in manual rate mode). ASI Outputs with Automatic Rate will be in this state if they do not have data to transmit.

MPTS Tab

The MPTS status tab has the exact same information as the MPTS subt-tab of the Configuration tab. PIDs are displayed in Decimal or Hexadecimal depending on the setting in the Configuration tab.

For More Information on...

- the configuration options and read-only information displayed in the MPTS sub-tab, refer to the section "**MPTS Configuration Tab**" on page 8-5.

Service Information

In This Chapter

This chapter contains the following sections:

- Troubleshooting Checklist
- Contacting Technical Support
- Warranty and Repair Policy

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your card, the following basic troubleshooting checklist may help identify the source of the problem. If the frame still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the Technical Support department at the numbers listed under the "**Contact Us**" section at the end of the manual.

1. **Visual Review** — Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the card, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check** — Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Input Signal Status** — Verify that source equipment is operating correctly and that a valid signal is being supplied.
4. **Output Signal Path** — Verify that destination equipment is operating correctly and receiving a valid signal.
5. **Card Exchange** — Exchanging a suspect card with a card that is known to be working correctly is an efficient method for localizing problems to individual cards.

Bootload Button

In the unlikely event of a complete card failure, you may be instructed by a Ross Technical Support specialist to perform a complete software reload on the card.

To perform a complete software reload on the card

1. Eject the card.
2. Press and hold the **Bootload** button, while re-inserting the card into the frame.
3. Release the button.
   - The **PWR OK** LED will flash green while the card is waiting for a new software load.
   - If a new software load is not sent to the card within 60 seconds, the card will attempt to restart with its last operational software load.
   - Contact Ross Technical Support for the latest software load for your card.

Contacting Technical Support

If you need support with your encoder, you can contact Ross Video using the contact information provided on the back cover of this manual.

If you need to contact Technical Support, be prepared to provide the following information:

- A detailed description of the problem, and any actions taken to solve it.
- A detailed description of the environment around the encoder. this includes the make and model of any encoder being used, as well as the connection network (IP or ASI) between the encoder and other devices.
- The Technical Support information file downloaded from the encoder itself. The file contains the current configuration of the encoder and a copy of the Event Log (which can also be obtained via the **Admin Event Log** tab). This file does not contain any information that would allow remote access to the encoder.

To download the technical support information for your encoder

1. Select the **Support** tab.
2. Click **Save** to save a file called `TECHSUPPORT.TXT` to the computer running the DashBoard client.
3. E-mail this file to Ross Technical Support.

Warranty and Repair Policy

The encoder is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of FIVE (5) years from the date of shipment from our factory. In the event that your encoder proves to be defective in any way during this warranty period, Ross Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this encoder has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the FIVE (5) year warranty period.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This User Manual provides all pertinent information for the safe installation and operation of your openGear Product. Ross Video policy dictates that all repairs to the encoder are to be conducted only by an authorized Ross Video Limited factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Ross Video Limited factory representative, will automatically void the warranty. Please contact Ross Video Technical Support for more information.

In Case of Problems

Should any problem arise with your encoder, please contact the Ross Video Technical Support Department. (Contact information is supplied at the end of this publication.)

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your encoder. If required, a temporary replacement frame will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

The Ross Video Technical Support Department will continue to provide advice on any product manufactured by Ross Video Limited, beyond the warranty period without charge, for the life of the equipment.

Notes:

Contact Us

Contact our friendly and professional support representatives for the following:

- Name and address of your local dealer
- Product information and pricing
- Technical support
- Upcoming trade show information

Technical Support	Telephone:	+1 613 • 652 • 4886
	After Hours Emergency:	+1 613 • 349 • 0006
	Email:	techsupport@rossvideo.com
General Information	Telephone:	+1 613 • 652 • 4886
	Fax:	+1 613 • 652 • 4425
	Email:	solutions@rossvideo.com
	Website:	http://www.rossvideo.com

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